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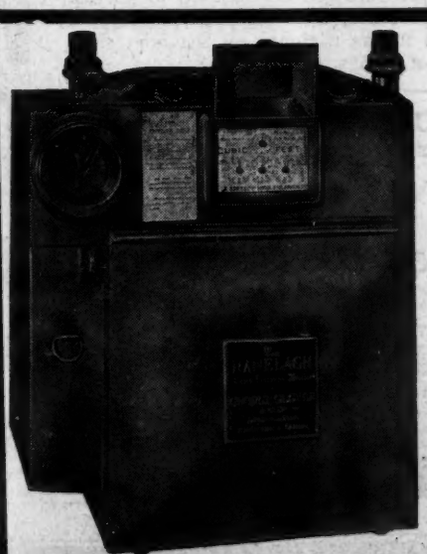

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EDITORIAL NOTES.

The Coal Strike, and the Threat that Failed.

A GLOOMY week for the country ended up with, metaphorically speaking, a burst of brilliant sunshine, which made people look quite benignly upon the callous atmospheric conditions accompanied by short coal rations, and a threat to gas consumers to cut-off their gas supplies if they were found to be indulging in extravagant use to supplement their limited quantity of coal. Earlier, and day by day and hour by hour, with the menace of the country being paralyzed by the stoppage of rail and transport services, there was increasing effort to bring about a settlement of the coal difficulty. The greater strike was postponed from Tuesday to Friday night, in the hope that the renewed coal negotiations would lead to a way out. But the miners' leaders made this impossible by their obstinate attitude. If ever a group of men, in the position of leaders and counsellors, betrayed the trust reposed in them, they did last week. There was no sign of statesmanship. What was most visible was their utter inflexibility in respect of their adopted policy. They made a great mistake in tactics, which did much to divert from their side public opinion which might have been up to a point sympathetic. Had they shown signs of a willingness to keep within the proper functions of trades unionism and discuss wages, and not avoid them, they would have encouraged support. But, on the contrary, they concentrated on political matters such as a national pool, a national board, and subsidies for maintaining the miners' wages; and they kept hoisted well in view unfounded allegations of bias on the part of the Government.

It seems to us the conduct of the Government displayed anything but bias. Nothing could have been more independent and impartial. The coal owners were against a national pool and subsidies, and so were the Government; but the owners were willing to forego their profits until the coal trade improved. The Government saw in the national pool something that would necessitate the resumption of national control; and no one wants that, except the extremists in the labour world, who see in it a more comfortable and effective course of political action for themselves. On the other hand, the Prime Minister stated that the Government were prepared to countenance a National Board, but they could not accept without investigation the owners' new scale of wages, as they were not satisfied that the proposals in all directions were what they should be. All the miners' leaders would say about the owners' scale was that it was constituted of "starvation wages." They made no discrimination between the high and the low; nor would they discuss the items to ascertain whether they could get amendment. It was a national pool, subsidies, and a national high level of wages that they were out for—whether the men in the different districts were, according to their conditions and opportunities, good or bad producers. A national pool simply means penalizing good mines to help the poorer ones, penalizing good producers to help the slack ones, and the encouraging of further slackness. This in a word is subsidizing and encouraging inefficiency all round. It can mean nothing else; and it is not the way to re-establish sound economic conditions in the coal industry. A series of suggestions, too, which the Government submitted to both sides, in which a national scheme of wages was put forward—a national board or committee which would settle wages in areas on a national basis—with Government financial assistance to tide-over the period of severe depression, was also rejected by the miners, without open discussion or statement of reasons. There were grave mistakes last week in the camp of the miners' leaders; and these mistakes contributed to the bringing-about of a *dénouement* which critical observers partly anticipated, but which on the surface of things as exposed to the public seemed almost hopeless.

But it came; and the nation was thus relieved of greater muddle, misery, and suffering. Outwardly all the public spokesmen of the leaders of the other two powerful sections of the Triple Alliance—the railway and transport workers—maintained a stoical front as though nothing but righteousness was in the attitude and demands of the extreme element of the Executive of the Miners' Federation, and as though the support of these demands would be justified by paralyzing the whole system of the country. Behind closed doors, however, there were scenes of contention between those leaders who wished to act humanly and justly and those who cared not a jot what happened so long as their rebellious spirits—spirits rebellious against law and order and just dealing—gained ascendancy in this opportunity for attempting to bring indescribable confusion and privation upon the country. But with it all the community remained unmoved. Britons never have been slaves; and they will not be the slaves of these extremists who have wriggled their way into the exalted seats of trade unionism. The upshot of last week's critical proceedings, too, accentuates the intelligence there is in the rank-and-file of the membership of the unions, and the resolve of these men not to be slaves of the extremists. It was quite obvious to those who made close examination of conditions that, in the general membership of the railway and transport unions, there was very strong antagonism to striking in support of the miners, and to being led into acting unpatriotically by altruistic leaders, especially without a ballot to ascertain upon which side was the preponderance of individual opinion of those most concerned. The week has brought a cogent lesson for labour leaders of the new school. They know now, if they did not realize it before, that the members of the unions to-day take greater interest in public affairs than was formerly the case, that those who have not been elevated to the position of leaders are capable (true in varying degree) of exercising independent judgment, and that many of them are not going to be driven when or where other men with whose principles they disagree choose. This is a victory for spreading education, and a growing capacity for exercising independent judgment. The leaders of the Triple Alliance by Friday had been forced to the conclusion that they were not from among the railway and transport workers going to obtain a solid response to the order to cease work. They did not want to make this confession; but truth will out.

A bridge was provided for them, unwittingly no doubt, by Mr. Frank Hodges, who is loyal to the Miners' Federation as its Secretary, but a man of independent opinion. The bridge was found in a speech of his to members of Parliament on Thursday night, in which he suggested a temporary settlement of the wages question on a district basis to give breathing space for a discussion and settlement of the matter on a national basis with a national pool. On Friday morning it was found that in this suggestion he had exceeded his instructions, and the Executive of the Miners' Federation rejected his temporary scheme. So in these circumstances the Triple Alliance met; and eventually, on the score of the confusion that reigned, the railway and transport sections agreed to cancel (not postpone) the order for a strike on Friday night. Before this occurred, there was a fierce struggle behind closed doors; but the sagacious ones were in the majority. And it soon got known that it was not only the confusion which reigned, but that the railway and transport leaders could not command solid support

in the threatened strike. Hence the cancellation order. This was all subsequently admitted. The leaders saw that only a partial stoppage would not assist, but would make more ridiculous the attitude and claims of the miners. The extremists were naturally angry. It is a rebuff for them that they did not anticipate. But it has also shown that a "Federation" of men holding views that are dissimilar and repugnant the one to the other cannot form a cohesive structure. What will happen now that the Triple Alliance has been put to the greatest test in its history, and mutual support has broken-down, is a matter for time to declare. It has shown that it is impossible to get elements into a permanent cohesive state that are physically—and shall we say mentally?—absolutely impossible of synthesis.

What will be the next step? The Government are not ceasing their plans for the protection of the country. The next few days are still critical in respect of the coal industry and an attempted realization of terms of settlement which will lead to a resumption of work in the mines. The Miners' Federation are left to carry on the fight alone; and the new position may result in the adoption of a new policy. We hope it will, if it means the bringing of the Executive down to a practical level. On Saturday, it was decided by the Executive to continue the contest unaided; and they then distributed themselves about the coal districts for local conferences regarding the future. What effect the altered situation will have in the coal areas cannot be gauged at present. We should imagine that, though at first there may be a display of anger, eventually there will be a moderation of view, especially with the funds of the District Unions running out and continued idleness a bit boring. Then perhaps a more reasonable attitude—an attitude not encompassed by one-sided conditions of policy—will be adopted in resuming negotiations, though there is a feeling in the country that the plan of the coalowners for wage reductions should by some means undergo certain revision in favour of the poorer areas and collieries. It is thought by some observers that the country would eventually suffer more by insistence on the acceptance of the lower of the suggested reductions than by arranging peacefully with the Miners' Federation (if the Executive will now be guided by a reasonable spirit and avoid political grounds) a scale of pay which bears some relation to the cost of living. We express no opinion as to this; it is the view of Mr. J. R. Clynes. The delegates are returning to London to-morrow; and on Friday there is to be a conference to report upon their visits to the districts. Then there will have to be decision as to policy and action in view of the altered circumstances. By that time there will have been no coal production for over three weeks. Compared with the outputs, with the lower employment, before the strike, this means a loss of output of over 12 million tons; contrasted with some weeks in December, of over 15 million tons. And the end of the strike is not yet. But the Miners' Federation has to learn that there comes a time when necessity compels a halt in such policy as they have chosen to adopt, and that the community is positively sick of attempted dictation by a section of workers as to policy in matters of national concern. No disinterested person wants to be unfair to the miners; and the most honest policy of the miners is to be fair to the rest of the community. That they cannot be while they accept without question the orders of leaders who are dogmatic and autocratic in their demands, and coercive in their methods. The country is very tolerant up to a point; but there are bounds to tolerance. Whenever a Trade Union has the rest of the community up against it, defeat will be its lot, whatever the issues involved.

Incandescent Coke for Water-Gas Making—Waste-Heat Boilers.

The gas men of the industry have boasted, and not without good cause, of the high thermal efficiency of carbonizing processes on modern lines. At the same time, there is no denying that there is a large amount of heat sacrificed on gas-works, for the simple reason that its utilization has received comparatively little attention. Waste heat brought to profitable utilization means fuel saved, and fuel economy is money saved—providing the cost of producing the saving does not annul all the money value of the fuel and other savings. But it is being gradually demonstrated that there is profit in saving waste heat—that the means of doing so can be provided at a cost which leaves a balance to the good in benefit. The more this demonstration goes on, the more it convicts gas-works of having been miserable sinners in relation to the dissipation of heat; and if we were to consider, in terms of fuel or money, the value of all the heat that is actually wasted in the aggregate on gas-works, the more appalling would become the evidence. In other columns to-day, an account is given of a visit that was paid to the two stations of the Brentford Gas Company, where the Chief Engineer (Mr. Alex. A. Johnston) has been working at the heat-saving problem, with the result that he is convinced that there are large economies to be extracted from this particular waste; and he is, as opportunity permits, putting his views into practice with good result. As a matter of fact, he sees no reason why, on a gas-works equipped with coal and water gas plants, boiler-houses and their chimneys, the ordinary boilers, the use of fuel, and the labour involved should not be dispensed with entirely, and the steam be generated wholly from the waste heat. His progress so far in heat saving is his warrant for the belief. A change of the kind, however, could, in the circumstances of present-day gas-works equipment, only come about gradually, as opportunity offered. But the assertion may be ventured from what was seen at the Brentford and Southall works last week that all extra steam that is required through expansion of gas demand will there be met not by the erection of boiler-houses and the installation of ordinary boilers, but by heat that has hitherto been dissipated; and in time ordinary boiler plant will in all likelihood disappear. Here, of course, we speak from observation, and not by the authority of the engineer.

Among the tenets of gas engineering, thermal efficiency to-day occupies a prominent place. This is as things should be, and more especially now that the industry is being translated from the old order of things to the heat-unit basis. It must itself set an example in heat economy and conservation, but does not know what can be done until the matter is put to test, and the best means of application are worked out. Theory is one thing; practical application is another. However, let that pass for the moment, and we will return to it presently. In our gas-producing processes, there is a considerable amount of waste heat. There is the waste heat that goes to the chimney from the heating of the retort-settings; more notable still is the amount of potential heat that is lost in the quenching of the incandescent coke; and there is the 40 to 50 p.ct. of heat that is lost in the water-gas process during the blow and run. Now, supposing part of the heat that is lost in the flue gases from the retort-settings and that from the water-gas plant is used for generating steam for the making of water-gas, and gives a surplus for other purposes. Suppose, too, that incandescent coke can be transferred direct from the coal-gas retorts to the water-gas generators, then it must be admitted that we have a combination of conditions which means considerable heat, fuel, and labour economy. That is what Mr. Johnston has commenced doing at the Brentford works, and as nearly as he can at the Southall works. At the former works, in one of the retort-houses, he has confronted four settings of (24) inclined retorts, carbonizing 30 tons of coal a day, with a Humphreys and Glasgow blue water-gas plant, the steam for which is generated from its own waste heat. The water gas plant and the retorts are only separated by the breadth of the stage-floor; and, by a telpher lifting and transport arrangement, the water-gas generator is fed with incandescent coke—the travel of the incandescent material from retort to generator occupying barely a minute. There is no breeze made. There is no waste. All the fuel put into the retorts is used for making gas, and the heat of the spent coke is saved. This is another form of complete gasification, but in two separate processes, which can be each tuned-up and governed so that the maximum efficiency can be obtained from both. Compare this with the methods that obtained in works planning at one time, when water-gas plants were placed a distance from the retort-houses, and caused no end of handling of coke and the making of breeze, and finished by dumping cold coke into the generators to detract further from their thermal efficiency. However, until Mr. Johnston is able to measure the volumes of gas made by this combined system, and give other data for it independently, nothing definite can be said regarding thermal results for comparative purposes with the method of total separate working.

When we come to the Humphreys and Glasgow waste-heat boilers at Brentford and Southall, we get on to ground where there can be confident speaking. Mr. E. G. Stewart

showed this in his paper, dealing with the same type of boiler at Fulham, in the "Journal" for March 30 last year. The evaporative duties that he gave were somewhat higher per 1000 c.ft. of water gas made than in the case of the Brentford waste-heat boiler; and we have no figures yet from Southall. But with the 750,000 c.ft. blue water-gas plant at Brentford, the quantity of water evaporated is 90 lbs. per 1000 c.ft. of gas made. In accomplishing this, between 800° and 900° are taken out of the waste gases and the water gas. An equivalent of 70 lbs. of steam is used on the plant for gas making and the blowers and pumps; so that there is a surplus of 20 lbs. to be run into the ordinary steam system on the works. We need not say more on this point. The descriptive article in other columns gives more details, and shows Mr. Johnston's complete satisfaction with the performance of the plant, as well as his intention to develop as opportunity serves the method of utilizing waste heat for steam-raising.

Earlier in this article the remark was made that "theory "is one thing; practical application is another." The problem of applying waste-heat boilers to coal-gas plants is not quite of the same order as applying them to water-gas plants. The conditions are different; and there has to be discrimination as to application. Experience is the best teacher in this respect; and what has been learned at Brentford will be a guide to others as to what to avoid. For drawing attention to this, gas engineers will be grateful to Mr. Johnston. The amount of waste heat that will be available for steam-raising in excess of that required for maintaining chimney draught may be computed; but, unless there is proper application, there may be a serious interference with the balance of heat distribution in the settings. The boiler that Mr. Johnston put in, as his first essay in this direction, six years or more ago, was intended to utilize the waste heat from sixteen settings of retorts. But it was found that it affected the heat balance in the settings; so its work was limited to eight settings. It could do more than this; but with the reduced number of settings, it works admirably, and demands very little attention. By it some 2600 lbs. to 2900 lbs. of water are being evaporated per hour. The experience suggests that, to use the system effectively, a number of boilers are required rather than attempt to concentrate all the heat at one point; or, to put it as Mr. Johnston did, to get an effective distribution of the heat in the retort-settings, it is better to have a number of boilers in the line of the retorts rather than one. However, the satisfaction that is being given by this boiler will lead to further application, when and as opportunity arises.

These are of the lessons derived from the visit to Brentford and Southall; and so far as the utilization of waste heat for steam-raising is concerned, the experiences there, we know, are being confirmed by those that are being met with day by day in connection with other large water-gas plants; and for coal-gas plants (more particularly vertical retorts) the waste-heat boiler is receiving excellent adoption.

Gas Making and Sale in a National Emergency.

While, in such an emergency as that we are now passing through, it is right and proper that the Board of Trade and the Mines Department should give directions and authority which will enable such an industry as gas supply to depart from the strict letter of its enactments, in order to conserve coal and assist in safeguarding the community from inconvenience and even privation in respect of fuel, the best interests of the community must be secured by placing in the hands of the responsible men directing gas undertakings a large amount of discretionary freedom. But it must be acknowledged that, whatever the nature of the emergency directions, the Board of Trade are found willing to listen to reason, and to revise the directions if a better way can be suggested. The National Gas Council know this to be so; and the Emergency Committee had experience of this the day before the coal strike took place. In the draft regulations which it was proposed to issue, the Committee found, in Part VI. relating to gas manufacture, points that required some amendment, and suggested modifications were adopted by the Mines Department. But subsequently the Department forwarded a letter urging still more stringent economy in the use of coal. The gas men of the industry are, and have been, straining every nerve to economize; and necessity compels them to do so, apart from patriotic determination to co-operate heartily in any measures coming within their province that will help to ease a very precarious situation. "Necessity compels." The present strike is one that is unparalleled in its features; and from the start no one could say anything as to its duration, though as to its effectiveness in preventing further supplies of coal coming along, there was no manner of doubt. Therefore from the first, with an eye looking towards an unknown end in respect of coal, the stringent economy desired by authority in its use was practised by the responsible gas officials, as they were not desirous of running-out stocks faster than need claimed, knowing full well that every pound of coal taken could not be replaced when that available on the market had been exhausted. As the National Gas Council informed the Mines Department, the best way to effect economy was to leave it to the discretion of the industry to save coal by utilizing to its utmost capacity water-gas plant wherever available. That is what is being done everywhere.

There is a cognate matter over which it is very easy to make mistakes. Even though these emergency directions (to which a further contribution will be found in later columns) as to coal, gas, and electricity consumption are in force, there may be an increase in the use of gas; and on the figures alone, without taking causes into account, the Mines Department may consider that this argues indifference on the part of officials of gas undertakings to the emergency directions. There cannot be comparison in respect of time, and therefore it is difficult to pass fair judgment, because gaseous fuel is persistently displacing solid fuel; and the more this proceeds, the greater will be the consumption of therms. Moreover, the vagaries of our climate cause wide discrepancies in use. Some days last week, the atmospheric temperature was such that it was possible to work without gas or any other fires; but on Friday to sit at work in a room without some means of heating was more than human flesh could stand. It is not indolence or indifference on the part of gas officials if the output of gas does not, by contrast with any preceding time, show a decline. Uncontrollable circumstances are alone to blame. We notice a report in the papers that the authorities at Birmingham have decided not to issue any coal permits to families in possession of a gas-cooker. The possessors of gas-cookers in Birmingham are fortunate; for it is better to depend upon gas than upon an uncertain delivery of a small quantity of coal.

In the emergency, the gas industry has been able to render assistance in the matter of fuel in more than one very effective way. A good number of people will no doubt be disposed to be rather grateful that the industry was not able profitably to dispose of its full output of coke before the strike; as in the accumulation at most works there was at ready command a fuel reserve of no mean value. To these accumulations and reserve, the National Gas Council immediately called the attention of the authorities; and the latter have drawn public notice to coke as an available fuel both for general domestic and industrial purposes. The Mines Department also consented to allow the authorities in each district to release immediately considerable quantities of coke to replace coal for industrial purposes.

Reverting to the manufacture and consumption of gas during the strike, it may interest those obstructionists to the progress of the industry who want a limit put upon the carbon monoxide content of town gas to learn that during the strike there have been gas undertakings that in the national interests have been distributing gas containing anything up to 60 p.ct. of water gas, and the consumers have been enjoying to the full the radiating value of the carbon monoxide contained in it.

The Illogical Prof. Armstrong.

The appearance of Prof. H. E. Armstrong at the Society of Arts last Wednesday has done nothing more than give additional publicity to the subject of low-temperature carbonization, and certainly has not subscribed anything to the advancement of its interests. The greatest point—and the most important one—on which he failed was the absence of information as to the economic aspects; but it seems (according to the reply to the discussion on his paper) that the cost of the process is not part of his business as a professor. It appears to us that the main business of an advocate of a process—whether a professor or anyone else—is to ascertain whether or not it is a payable one, because if it is not it is bound to end in failure. This confession of Prof. Armstrong renders all the more humorous his past and present denunciation of the practices and men of the gas industry, because it is obvious he has been recommending them to do some-

thing the soundness of which economically he cannot vouch for. He could not very well avoid this economic aspect, because he had the Chairman (Sir Arthur Duckham), Mr. G. M. Gill, Dr. Harker, and others, all on his track regarding it; and he had nothing better to say than that the cost of the process was not his business as a professor! Nevertheless, looking at the gas industry through the wrong end of his telescope, it seems to him that it is again in a critical condition; and it should make up its mind whether it would go into partnership with other interests. We search among the components of the paper and reply to the discussion to ascertain why he has arrived at the conclusion as to the industry being in a critical condition. The price of gas appears to be one reason. The price of gas is due to everything that also affects the price of coalite; and the probabilities are, looking at the work that is proceeding, and will proceed still more under the powers of the Gas Regulation Act, to produce heat units in the form of gas more economically, that the incidence of cost will be lightened more rapidly in the case of gas than of coalite. We should certainly have liked to see a comparative statement from the Professor as to the present best relative efficiencies of the two processes. It may be taken for granted that, if coalite could serve better than gas the tendency of public demand for fuel, then, if superior economically, gas men would not be slow in making a move towards its adoption. It seems to be very clear that Prof. Armstrong does not give the gas industry any credit for being in possession of brains; but whatever he may think in this regard does not alter fact, nor disturb in the slightest the technical men of the gas industry.

Let us get to another point, which further illustrates how illogical is the Professor. He quotes Accum, going back a hundred years or more ago, as having said that the demand for coke in London, after the establishment of the Gas Light and Coke Company's works, increased prodigiously, and many used coke to the total exclusion of coal. "Why," asked the Professor, "did people turn to this new material "a hundred years ago?" His answer is "because it was "a clean, honest fuel, and not a dirty one." The gas industry carbonizes something like 20 million tons of coal a year. It did not do so in 1819; and it has now several million tons of coke to dispose of per annum, and the sales are not of the pigmy order of a hundred years ago. Accum was writing in the light of his own contemporary experiences. As we have seen, the Professor spoke later of the gas industry entering into partnership with other interests. Presumably, he means the interests engaged in low-temperature carbonization. Surely if gas undertakings could produce a "clean, honest fuel, and not a dirty one," a hundred years ago by low-temperature operation, they could do so now if there was the public demand, and clean coal was supplied to them. When coalite was originally put on the market, there was an experimental attempt by the Gas Light and Coke Company to ascertain whether a public demand really existed for such fuel. But it is very unfair of Prof. Armstrong to allege that this action in making smokeless fuel in ordinary gas-retorts crippled new enterprise; "the public "view being that if the new fuel could be made by gas "companies at any moment, why should a new company be "formed for its production." This is an amazing statement when account is taken of the enormous capital that has been subscribed and lost in coalite, and when we remember the friable nature of the material which the old coalite companies turned out. That the statement is untrue, that the gas companies crippled the new enterprise by making smokeless fuel in ordinary gas-retorts, is proved by the admissions of the Professor himself. Coming down to quite modern times, and so to the construction of the Barnsley plant, he confesses that even then the great mistake was made that a complete works was erected before the efficiency of the primary unit had been established, and even before the problem and the requirements to be met were fully understood. Therefore, even then—in comparatively recent times—the "new enterprise" had not made a practical success of their plant and process. In fact, we get right down to November, 1920, before a type of plant is built which Prof. Armstrong describes as "undoubtedly a prac- "tical success." From the account which he gives of the plant and its working, we should imagine it will be somewhat expensive in respect of costs of production.

As Sir Arthur Duckham says, the success of the system hangs on two things—the value of the coalite and the value of the oil. As to the latter, Prof. Armstrong admits that it is too soon yet to speak of its uses in definite terms; and as to the coalite, he thinks the public would be prepared to pay a higher price for it than for coal. We doubt it. The increase of gas consumption for fuel purposes shows a decided trend of public favour to labour-saving fuels; and coalite, like coal, necessitates the lighting of fires, the storage (and big storage) and carrying of the fuel, the continual cleaning of grates, to say nothing of the dust created, which will be the same with coalite as coal, seeing that the ash in the coal is concentrated in the coalite. The gas industry is developing the use of its coke for industrial purposes; it is turning more of it into heat units in gaseous form which does not involve any labour between the gas-works and the point of use; it is even indulging in complete gasification, and investigating in this connection the saving of the tar oils and the ammonia; it is also looking to the day when in complete gasification it will be able to show a thermal efficiency in gas of 90 p.ct.—anyway, the advocates of the oxygen-steam process say that may be the efficiency when the cost of oxygen comes down to reasonable limits. Meanwhile, the low-temperature process seems, as Dr. Harker says, to rest, from the economic aspect, on a very narrow margin.

Co-Operative Tar Schemes.

These are becoming more and more popular among gas undertakings and tar distillers; but there is no reason why, as experience is gained, the lines of the schemes should not be improved. The Commercial Section of the Manchester District Institution of Gas Engineers have drawn up an alternative scheme, which, it is stated, gives greater benefits to the tar producer than any other collective scheme which has been published. That some of the large tar distillers in the Lancashire area are agreeable to the alteration is shown by the report that "several" of them have accepted it. No information is available yet as to the terms of the alternative scheme; but the next monthly report of the National Gas Council will contain particulars for the information and consideration of the members.

Model Gas Bill Revision.

The Model Gas Bill is now in several respects altogether obsolete. The Gas Regulation Bill undermined its provisions, and so have the changed financial conditions—general, and those that have hitherto statutorily applied to gas undertakings. A thorough overhauling of the Model Bill is now required, and that from beginning to end. As it stands, it is absolutely useless. The National Gas Council have the matter in hand; and there is to be conference with the authorities on the subject. But we are anticipating fewer Gas Bills in future, as we believe the main legislative channel will be *via* the Board of Trade and Special Orders.

Wasted Ammoniacal Liquor.

In the report of the Chief Inspector under the Alkali Works Regulation Act, there have frequently been references to the loss of ammonia through the smaller gas undertakings having difficulty in profitably disposing of their production, and so allowing it to run to waste. The National Gas Council have been obtaining information on the point; and in the result they are evidently satisfied that waste is going on, and unavoidably, through the lack of disposal opportunities. Much might be accomplished to avert this by co-operation between the larger and the smaller gas-works, by which the latter might dispose of their ammoniacal liquor makes to their better-placed neighbours, to the mutual advantage of both. The Council have called the attention of the Sulphate of Ammonia Federation to the matter, with the view to ascertain whether something cannot be done in the way of co-operation.

Electricity Supply Financial Powers.

The Government have yielded to pressure, and reintroduced the Electricity Supply Bill, No. 2. Without the financial sanction which this measure would give to the joint authorities and the constituent bodies, it has been felt that the work of the authorities who are willing to form joint authorities, as well as that of the Electricity Commissioners, will have been in vain. The Municipal Corporations Association, the London County Council, and numerous other authorities have urged the Government to push forward with the Bill. But large ratepayers—such

as railway companies and gas undertakings—while they cannot object to financial authority being conferred, should make an effort to ensure that money lent or subscribed by local bodies is well protected, and that the rates do not suffer any additional burden in consequence of this speculative reorganization of electricity generation.

An Unmysterious Fire.

There have been quite a number of "mysterious" fires lately in business premises and private dwelling-houses. The origin of these cannot be attributed to any political motive; and there has been difficulty in tracing the causes. But Mr. H. Collins, milliner, draper, and fancy goods dealer, of Cardiff, has little doubt as to the origin of a fire which consumed the contents of three of his shops, and caused damage to the extent, he estimates, of between £20,000 and £30,000. When dealing with the fire, the Superintendent and two members of the Fire Brigade received severe shocks through their helmets coming into contact with live wires; and they had to get out into the open to recover their equilibrium. That is a point connected with electric wiring of which fire brigade authorities should make note, as it may be found necessary to cloak the men's helmets in some insulating material. It is thought that a "likely solution" of the fire was the fusion of a wire. But the irony of this for Mr. Collins is that it was only a couple of months since that electricity substituted gas as the means of lighting. Our electrical competitors are fond—very fond in fact—of telling people that the only way to gain immunity from fire is to instal electricity. A great deal of damage (it was also reported in the paper from which we learn the particulars of the Cardiff disaster) has been done in a dwelling-house at Newport; but in this case it is only "supposed" to have been caused by the fusion of an electric wire. The tenants were away from home at the time of the outbreak

American Coal.

Particulars are now available as to the extent to which American coal was supplied to France and other countries of Europe last year in competition first with British coal, and then stimulated by the strike of the miners in the autumn. Before the war the export of American coal to Europe was practically *nil*. The coal strike last autumn gave the American exporters a larger opportunity. During the three months, September to November, 1920, the shipments of American coal to France amounted to 2,071,830 tons, or a monthly average of 690,605 tons, as against an average of 177,477 tons during the first eight months of the year. American exports to other countries in Europe, which had averaged 800,000 tons per month up to the end of August, rose to 907,000 tons per month during September to November.

Before the Strike.

There was a heavy falling-off of coal output in the last weeks preceding the miners' strike. The production for the week ended April 2 (which included the first two days of the strike) was only 1,950,100 tons, against 3,660,000 tons in the previous week, 4,240,400 tons in the week ended March 19, and 4,277,200 tons in the week ended March 12. For the week ended April 3, 1920, the output was 3,979,747 tons.

FURTHER RESTRICTIONS ON FUEL, LIGHT, AND POWER.

Suggested Circular to all Gas Consumers.

THROUGH the prolongation of the coal strike, the Mines Department have issued additional restrictions regarding the use of fuel, light, and power. Local authorities outside the Metropolitan area are informed that permits for the supply of coal to industries should not be issued except where the industry comes within one of the categories of exception indicated in previous directions. The object is to conserve available coal to ensure that food-producing and other vital industries are kept going; but even to these industries permits are not to cover supplies for more than one week.

The regulations as to the reduction of gas and electric power supplies to industries are to be rigidly enforced. In regard to domestic supplies of gas and electricity, local authorities are urged to support energetically the attempt of the Government to enforce economy, even to the extent of cutting-off supplies where the supply is being used uneconomically. Gas and electricity undertakings are asked to issue a circular to all consumers pointing out that to ensure that existing stocks of fuel of all descriptions—coal, coke, and gas—shall last as long as possible, and to reduce the risk of hardship to every member of the community which would result from the exhaustion of these stocks, an appeal is made to every consumer:

1. To reduce the use of fuel to the utmost by doing only so much cooking as is absolutely necessary; by reducing the use of hot water for washing and baths to a minimum; and by never lighting a fire without actual need.
2. To buy coke or wood in preference to coal.
3. To curtail the use of artificial light and heat in every possible way—*e.g.*, by removing a proportion of electric light bulbs in houses or other buildings, by using those that remain only when absolutely necessary, by strict supervision of gas-cookers, by the discontinuance of lights in halls, landings, and staircases, and by severely restricting the use of geysers in bathrooms.

By carrying-out these injunctions strictly, every member of the community will do his or her share in conserving the supplies of fuel, and so render valuable service to the country in this time of pressure and difficulty.

FURTHER ORDERS ISSUED UNDER THE GAS REGULATION ACT.

FROM the Director of Gas Administration of the Power Transport and Economic Department of the Board of Trade (Mr. H. C. Honey) have been forwarded copies of further Orders issued under section 1 of the Gas Regulation Act, 1920. We give below particulars of these Orders in so far as the terms differ from the Gas Light and Coke Company's Order, which was given *in extenso* in the "JOURNAL" for March 30 last (p. 799). In the case of the Scotch companies, notice of the "declared value" is to be given in the "Edinburgh Gazette." The dates on which the Orders shall come into operation are given in parentheses.

Hornsey Gas Company.

After the declared date, the standard price in respect of gas supplied by the undertakers shall be 16d. per therm.

For the purpose of ascertaining the authorized rate of dividend for the year in which the declared date occurs, the price charged per 1000 c.ft. during that part of the year (if any) before the declared date shall be rendered into the equivalent price per therm by dividing it by $4\frac{8}{8}$d.

CHARGES FOR PREPAYMENT METERS.

(1) The undertakers may demand in respect of gas supplied through a prepayment meter a not greater charge than in respect of gas supplied to private consumers within their limits of supply through any other kind of meter or by any other method of supply.

(2) (*a*) The charge for the hire of any prepayment meter and fittings to be used therewith shall be a sum of money calculated according to the number of therms supplied; and the maximum rate of charge shall be:

For a prepayment meter and fittings (including a cooking stove) $3\frac{3}{8}$d. per therm.

For a prepayment meter and fittings (not including a cooking stove) 3d. per therm.

(*b*) The charge for the hire of a prepayment meter, without fittings, shall be either a sum of money calculated according to the number of therms supplied (when the maximum rate of charge shall be $1\frac{1}{8}$d. per therm) or at the rate of 10 p.ct. per annum on the cost of the meter, whichever shall be the higher.

(*c*) The said charges shall include the providing, letting, fixing, repairing, and maintenance of the meter and fittings or of the meter (as the case may be) and the cost of collection and other costs incurred by the undertakers in connection therewith. (April 11.)

Newport (Mon.) Gas Company.

As from the declared date, the maximum price in respect of gas supplied by the undertakers shall be 19d. per therm. (April 18)

PERSONAL.

Mr. J. KEOGH, of Kilkenny, has been appointed Manager of the Bagnalstown (co. Carlow) Gas-Works.

Mr. A. C. TAYLOR, Distribution Engineer and Assistant to the Colombo Gas and Water Company, has been appointed Manager of the Royston (Yorks.) and District Gas Company, Ltd.

Mr. J. W. HAYES, the Manager of the Eckington and Mosboro' Gas Company, has been appointed Secretary also, in the place of Mr. A. E. HALL who has vacated that position after twenty-five years' service.

For the position of Engineer, Manager, and Secretary to the Tawe Valley Gas Company, Mr. D. J. BRANSON has been selected. He is at present Engineer and Manager of the Pontefract Corporation Gas Department.

The new Secretary and Manager of the Grange and Cartmel District Gas and Water Company is Mr. W. I. FLETCHER, formerly of the Langley Mill, Kirkby-in-Ashfield, and Fleetwood Gas-Works. After being some seven years Manager of the Carnforth Gas-Works, he was appointed to a similar position at Abersychan, which he now vacates for that just announced.

Mr. W. H. DAVIS, having intimated to the Directors of the Bidford-on-Avon Gas Company that he desired to be relieved

of the position of Secretary, at their last meeting was thanked for his services during the past thirteen years, and was invited to take the position as a director rendered vacant by a death on the Board. Mr. George E. Boshier was appointed Secretary.

OBITUARY.

Mr. Samuel Bowes Beaumont, the Chairman and a Director for twenty years of the Elland-cum-Greetland Gas Company, (also a director of many other Yorkshire gas concerns), was found dead in his bath on the night of April 5. Mr. Beaumont, who was 52 years of age, did much work during the war in local food control, and was Hon. Secretary of the local V.A.D. Hospital Committee.

The death took place on the 9th inst. of Mr. Bertram Blount, whose name frequently occurred in former times as a speaker at many of the technical societies the meetings of which are reported in the "Journal." He was a well-known electro-chemist, and was for some years in partnership with Mr. R. H. Stanger, under the style of Stanger and Blount, but lately practised on his own account. He was the author of several works on applied chemistry and electro-chemistry, including "Chemistry for Engineers and Manufacturers," for which he and Mr. A. G. Bloxam were jointly responsible.

NATIONAL GAS COUNCIL.

Meeting of the Central Executive Board.

A meeting of the Central Executive Board of the National Gas Council was held on Tuesday last week, at No. 30, Grosvenor Gardens, S.W.—Mr. D. Milne Watson in the chair—when the following matters were discussed.

Coal Position.

A meeting of the Emergency Committee of the Council on March 31 was reported, in order to consider Part VI. of the Coal (Emergency) Directions, 1921, as drafted by the Board of Trade. Amendments to the Order proposed by the Emergency Committee were subsequently adopted by the Mines Department.

A further letter was reported from the Mines Department as to still more stringent economy in the use of coal. It was resolved, while assuring the Department of the hearty co-operation of the gas industry in their efforts to ensure economy in this direction, to submit that the best way to effect such economy was to leave it to the discretion of the industry to economize coal and to utilize water-gas plant wherever available to its utmost capacity. It was also agreed to advise the Mines Department that an increased consumption of gas at the present time did not necessarily argue indifference on the part of the gas undertakings to the emergency directions, but only pointed to the increased use of gas in lieu of solid fuel.

Coke.

It was reported that the attention of the Government had been drawn to the stocks of coke in the country that might be utilized in place of coal during the present crisis, for both domestic and industrial purposes; and that in cases where large stocks of coke were held by gas undertakings, the Mines Department had consented, at the Council's request, to arrange for the local authorities in such district to release immediately considerable quantities of coke to replace coal for industrial purposes.

Gas Regulation Act.

The unsuccessful application of the East Ham Corporation to the Board of Trade for further inquiry into the application of the Gas Light and Coke Company for an Order under section 1 of the Act was reported—applicants being ordered to pay costs.

A list of the Orders already issued under section 1 of the Gas Regulation Act was read, with the standard or maximum price per therm that had been granted, and the "declared" date of the operation of the Order.

Railway Rates.

It was reported that it had been suggested that the Council should co-operate with the electrical interests with regard to lower transport rates for coal. The matter would be discussed with the interests concerned and reported upon further at the next Board meeting.

Key Industries Bill.

The financial resolutions relating to this Bill were considered, with special reference to gas-mantles and heat-resisting glass; and it was decided to take the necessary steps for safeguarding the interests of the gas industry.

Supply of Electricity by a Railway Company.

Counsel's opinion was read on the legality of the action of a railway company in supplying electric energy to premises within the area of supply of a statutory gas company. The opinion of counsel was submitted to the effect that the Railway Company were acting beyond their powers. The Council resolved to ascertain further details with a view to supporting the gas company in their claim against the railway. The matter is to be further discussed at the next meeting of the Board.

Supply of Electricity in Bulk by a Military Power Station.

Complaints had been received from a statutory gas company to the effect that the local urban district council, at the suggestion of the Electricity Commissioners, had made application for a supply of electricity in bulk from the local military power station. The steps taken by the Council in this matter were reported, and further consideration was postponed until the next meeting of the Council.

Housing in South Wales.

The recommendations of the Committee appointed by the Ministry of Health with regard to housing and town planning in South Wales, which included the large-scale production of gas at a few well-equipped works, were referred to the South Wales District Executive Board for consideration and report.

Model Bill.

A meeting of the Sub-Committee of the Council appointed to consider the Model Bill and clauses was reported as having taken place on March 8, with the result that the Lord Chairman was to be consulted by the Council's Parliamentary Agents on a number of suggested amendments.

Price of Meters.

Slight reductions by the meter makers in the prices of meters and repairs were reported; these reductions to take effect in respect of unexecuted orders on the makers' books.

Co-Operative Tar Scheme.

It was reported that the Management Committee of the Manchester District Executive Board had discussed the question of tar prices, and considered an alternative co-operative scheme submitted by the Commercial Section of the Manchester District Institution of Gas Engineers. It was reported that this scheme gave greater benefits to the producer than any other collective scheme which had been published. Several large distillers had accepted the scheme in the Lancashire area. It was resolved that the scheme should be published in the Council's monthly report for the consideration of members.

Ammoniacal Liquor.

It was stated that the Council had sent out a questionnaire to all gas undertakings making 75 million c.ft. of gas or less per annum, in order to ascertain how much ammoniacal liquor was being run to waste. The returns clearly indicated that the task of disposing of the liquor was one of increasing difficulty. It was resolved to place the position before the British Sulphate of Ammonia Federation, with a view to co-operation between large and small gas-works for the disposal of ammoniacal liquor to their mutual advantage.

It was reported that the position as regards the sulphate of ammonia market was somewhat improved, and that Germany would appear to have under-estimated her home demand.

Price of Sulphuric Acid.

It was reported that the National Sulphuric Acid Association Costing Committee had agreed to receive a deputation from the Spent Oxide Committee of the Council, in order to discuss the question of a further reduction in the price of sulphuric acid.

INSTITUTION OF GAS ENGINEERS.

Council Meeting.

A meeting of the Council was held at No. 30, Grosvenor Gardens, Westminster, on Friday, the 15th inst.—Mr. Thomas Goulden, M.Inst.C.E., the President, in the chair.

Personal Matters.

A tribute was paid to the memory of those whom the Institution had lost by death since the last meeting—viz., the Rt. Hon. Lord Moulton, F.R.S., Past-President; Mr. Robert Porter, of Elland; Mr. W. B. Randall, of Waltham Cross; and Mr. S. Trow Smith, of Malvern, Members. A letter conveying expressions of sympathy on the loss of Lord Moulton was received from the Société Technique de l'Industrie du Gaz en France, which had been suitably acknowledged.

It was reported that the American Gas Association had elected Mr. Goulden as an Honorary Member for the term of his office as President of the Institution.

Applications for membership were considered, and the following were approved for the next ballot as candidates: For the class of Member: Mr. Wm. Bennett, of Mossley; Mr. John S. Brown, of New Mills; Mr. Bertie Calvert, of Northallerton; Mr. Edward E. Calvert, of Fulham; Mr. Albert Cook, of Warrington; Mr. John Green, of Wisbech; Mr. Ernest Hardiker, of Smethwick; Mr. Edward Hargreaves, of St. Annes-on-the-Sea; Mr. Thomas W. Harper, of Ayr; Mr. Arthur A. Lucas, of Newhaven; Mr. Leonard F. M'Leod, of East Greenwich; Mr. Ernest L. Nicholas, of Blackburn; Mr. Robert E. Onions, of Alfreton; Mr. John H. Ranft, of Lytham; Mr. John Sheridan, of Stratford; Mr. Thomas H. Wallington, of Beckton; Mr. Frank E. Ward, of St. Helens, Lancs.; and Mr. Mortimer Watson, of Ballymena. For the class of Associate Member: Mr. Harry Curtis, of Macclesfield; Mr. Charles F. Dakin, of Cradley Heath; Mr. John H. Greenacre, of Gorleston; Mr. Herbert D. Lees, of Hexham; and Mr. Ronald A. Weston, of Norwich.

The following were transferred from the class of Associate Member to Member—viz., Mr. John G. Cleator, of Cirencester; Mr. Robert W. Hunter, of Beckton; Mr. S. A. M'Minn, of Beckton; Mr. Eric W. Morrison, of Nottingham; Mr. Frank J. Pearce, of Mill Hill; Mr. Thomas H. Poulson, of Stafford; and Mr. L. A. Rumble, of Reading.

Mr. F. H. G. Higton, of Sheerness; Mr. Reginald A. Mott, of Whitehaven; and Mr. Gareth A. Wright, of Bristol, were admitted Students of the Institution.

Nominations for the year 1921-22 were made for elections to the offices of President, Vice-President, Hon. Secretary, Ordinary Members of Council, and Auditors. The following elections as District Members of Council for that period were reported from the respective Associations—*viz.*, Eastern Counties Gas Managers' Association, Mr. A. W. Sumner, of Grays; Manchester District Institution of Gas Engineers, Mr. E. H. Hudson, of Normanton; Midland Association of Gas Engineers and Managers, Mr. James R. Duff, of Banbury; North of England Gas Managers' Association, Mr. F. C. Willis, of Tynemouth; Southern Association of Gas Engineers and Managers, Mr. John W. Whimster, of Bath.

Forthcoming Annual Meeting.

The programme of the annual meeting (opening on Tuesday, May 24) was further considered and approved, including the arrangements proposed for the reception of the Société Technique de l'Industrie du Gaz en France. Facilities were granted to the National Association of Technical Gas Officials for holding their annual meeting on the afternoon of May 24.

Committees' Reports.

A statement was presented indicating the state of progress of the work of the Gas Investigation Committee, on which two reports will be submitted at the Institution's forthcoming meeting. The report of the Refractory Materials Research Joint Committee, which was presented by the Chairman (Mr. A. E. Broadberry) and adopted, gave particulars of the effect of transferring the Committee's work to the newly-formed British Refractories Research Association, of which the Institution is a member—its representatives on the Association's Council being Mr. Broadberry and Mr. W. E. Price.

The report of the Life of Gas-Meters Joint Committee was presented, accepted, and adopted. The Committee recommended that steps should be taken, through the National Gas Council, with a view to inserting in Orders under clause 10 of the Gas Regulation Act and Private Acts of Parliament clauses dealing with the questions of the overdriving of meters of inadequate capacity and the provision of a valve where an air-blast is employed.

Miscellaneous Business.

The action which had been taken by the Emergency Committee in the preparation of technical evidence on behalf of the National Gas Council for presentation to the Board of Trade Committees on Carbon Monoxide and on Inerts, was reported upon.

Further consideration was given to the proposed revision of the payment clause in the "Standard Conditions of Contract" adopted by the Institution and the Society of British Gas Industries; and the terms of a communication to the Society embodying the Council's views were agreed to.

Suggestions of the City and Guilds of London Institute Examiner (Mr. R. J. Rogers) as to the desirability of revising the method of carrying out the practical examinations in "Gas Fitting" were submitted. The recommendations of a conference on the subject which had taken place between the Emergency Committee, Mr. Chas. Hawkins, the Superintendent of the Department of Technology of the City and Guilds of London Institute, and Mr. Rogers, were reported. It was resolved that they be adopted for application to the examinations in 1922 and subsequently.

Dr. Charles Carpenter was re-elected as the Institution's representative on the British Engineering Standards Association Sectional Committee on Pipe-Flanges, and Mr. Thomas Hardie was elected as successor to Mr. Charles Hunt, who had resigned.

Communications were reported from the Institution of Civil Engineers intimating that their Council do not intend to proceed with the Bill proposed by them last year to provide for the registration of engineers; and that they have decided to apply for a Supplemental Royal Charter to authorize the use of the professional description "Chartered Civil Engineer" by corporate members of the Institution. The award of the Kelvin Gold Medal to Dr. W. C. Unwin, F.R.S., was also reported by the Institution of Civil Engineers.

The report for the year 1920 of Major Kenelm Edgcumbe, the Chairman of the National Illumination Committee of Great Britain (with which the Institution is affiliated), as also that of the Institution's Finance Committee, was presented, accepted, and adopted.

Assay of Coal for Carbonization Purposes.—The Secretary of the Department of Scientific and Industrial Research calls attention to the fact that, throughout Technical Paper No. 1, dealing with the assay of coal for carbonization purposes, "grs." should read as "grms." The paper was noticed in the "Journal" for March 23, p. 740.

ELECTRICITY SUPPLY MEMORANDA.

The question has been lately raised as to whether or not the Electricity Commissioners did not exceed their powers in giving the Kingston-on-Thames Electricity Department authority to make a higher charge for electricity during a period anteceding the date of the issue of the Order which varied the then existing statutory maximum charge, which charge was the highest legal one that could be made prior to the issue of the Order. Now a "Legal Contributor" to the "Engineer" raises another point in which it seems the Commissioners have, in his view, exceeded their legal province. It will be remembered that last year the Commissioners gave the Nottingham Corporation power to erect a large generating station on certain conditions, one of which was that, if a joint authority is set up for the district under the Electricity Supply Act, 1919, the Corporation shall, if required by that authority, and if directed by the Commissioners, transfer the station to the joint authority—the Corporation being reimbursed on certain terms. The "Legal Contributor" asks whether the Commissioners had, or have, the power to impose upon the Corporation liability to perform a contract with a joint authority—this being a body not already in existence. And will the powers of the joint authority when formed confer upon them any right to compel the Corporation to accede to the conditions laid down by the Commissioners? Section 6 of the 1919 Act enacts that "a scheme . . . may provide for the exercise by a joint authority of all or any of the powers of the authorized undertakers within the electricity district, and for the transfer to the authority of the whole or any part of the undertakings of any of those undertakers—*provided that no such scheme shall provide for the transfer to the authority of any part of an undertaking, except with the consent of the owners thereof.*" It is manifest from this that the joint authority can exercise no compulsion. It can only take by agreement. Could the Corporation be compelled to carry out the bargain made last summer; and, if so, by whom? In the opinion of the "Legal Contributor," the joint authority, being a "principal" not in existence at the date of the Commissioners' report, cannot, when created, force the undertakers to sell the station on terms settled by the Commissioners. So it seems that it is vain for the Commissioners to impose a condition that the undertakers shall sell to the joint authority. Even the Commissioners themselves have no authority to sue. It seems therefore that the Commissioners sadly want some legal guidance in their work.

Legal Powers of the Commissioners.

The "Electrician" has brought out a "Spring Trade Promotion Number," the advertisements in which suggest that it is also a "spring advertisement promotion number." We have read several of the articles in the issue. They are all on the question of developing the use of electricity; but one has only to read, and not necessarily carefully, to see that most of the writers are obsessed with the difficulties which, for domestic purposes, cling tenaciously to electricity, and cause them, if they do not all express it, to believe that "the all-electric idea will be comparatively slow of realization." Of course, the housing problem has, directly or indirectly, a considerable place in the special number. The leader writer states that a demand has arisen for a class of house in which labour shall be reduced to a minimum; and, of course, in his imaginative brain, it is not surprising to find that this complete labour-saving can only be achieved by electrical means. If there is such a demand for houses in which the maximum labour saving can be effected, and it can only be best accomplished by electrical means, then in the name of common sense why does not the all-electric idea make more rapid progress than it has hitherto done? The leader writer himself finds reasons; several others are found sprinkled about among the articles of the number which was conceived—not, of course, for promoting the influx of advertisements, but for promoting at a more rapid rate the trade in electrical appliances. The number, so far as we can see, will not serve that end, as it emphasizes the electrical disabilities which have not yet been conquered, and, if anything, appear to be worse than ever. One of the reasons that the leader writer gives as retarding the development of the domestic electric idea is that neither in design nor in manufacture is some of the apparatus which is being put upon the market so good as it should be. But there are other reasons. Cost is one. We find this prominently put forward in an article describing what has been done in connection with the Maidstone housing scheme, in which article it is shown that the expense connected with the hiring of apparatus necessitates charges which compare badly with gas. There is also the cost of running electrical appliances. Figures are given in the number showing the aggregate consumptions for groups of three or four flats in a London area. But they prove nothing. If the figures were analyzed, it would probably be found that one flat might have an enormous consumption; another a small one. Similarly it is no use comparing the gas costs of a family of three with the electrical costs of a family of six. We know this from gas-supply experience. The bill of a family of six, under comparable conditions of appliances fixed, may be found to work out to less than that of a family of three. The leader

"Promoting" Trade in Electricity.

writer—all these years after electrical appliances have been on the market—sapiently tells his readers that those responsible should realize and remove existing defects in domestic electric appliances rather than leave them to be discovered by the public in what may be somewhat trying circumstances. The author of one of the articles also insists upon reliability, accessibility, and low cost of repairs being essential factors, which submission has admittedly an eloquence of no mean order. Still another writer discourses on cheapness being a fallacy in house wiring. It is found, too, that in some areas new consumers and heavier loads cannot be taken on without reinforcing distribution capacity at the heavy capital expenditure of to-day; and there is a marked division of opinion as to whether overhead wiring shows such economy and advantages as to justify its superseding underground cables. The "trade promotion number," with an emphasis on the "promotion," is somewhat amusing.

Disabilities Continued.

Of course, in the articles there is no artificial lighting possessing all the virtues as does lighting by electricity. Yet we read in them how important it is that some protecting medium should be put between the bulbs and the eyes of the users, which means greater expense in installation and maintenance. The masses of the people cannot afford this sort of thing. Yet where electric lighting is provided in the new housing schemes, we have not yet come across a case where provision has been made for this protection. The tenants do not yet know much about the matter. They will have to find out about it by bitter experience. Not for this reason, but on account of cable laying and installation, several housing authorities have dropped even the electric lighting part of their schemes. They were wise. At the present time, 45 of the houses in the Maidstone scheme are inhabited and using electric light; but beyond lighting the use of electric appliances has not made much headway—nine or ten electric irons have been installed, and four electric fires. Writes Mr. E. E. Hoadley, the Electrical Engineer: "So far as my experience has gone up to the present, I have undoubted hopes for the use of electricity in houses of this type; but whether on a purely lighting load under present conditions it is a paying proposition, 'I hae ma doots.' Time alone can prove." In this connection there has been advocacy to escape the provision of meters of the fixed charge system; but we see that the author of one of the articles states that in a district of which he has cognizance where fixed charges were based upon an estimated annual consumption of 80 units per consumer, the average consumption reached the enormous figure of 580 units per consumer in one year. Then as to heating and cooking, discreet economy of information is noticeable in these respects, more especially in relation to costs. Westminster, like St. James's and Pall Mall, does not represent a normal residential area. But a writer who supplies information as to what is being done in the Westminster area, is inclined to think that electric heating is becoming the "chief form" of heating to-day. He cannot study gas statistics and movements; and he overlooks that Westminster is not representative of the rest of the country. These electric-heaters are let out by the Supply Corporation at a rental of 10s. 6d. per annum; but at present they have only 14,604 KW. of heating load. They also let-out cookers; but at present they have only 2000 KW. connected with the mains for cooking purposes.

The Water-Heating Problem.

Our electrical friends are still confronted by the water-heating problem. They cannot overcome the need for time economy; and the cost is not economical to the users. Some still think that coal will have to be used for water heating; others condescend to favour gas coke; while still others give their adhesion to the continuous creeping of current into elements submerged in a storage of water if the difficulties of furring-up and heat losses can be overcome. We have heard much of the inconveniences of this system; but Mr. C. Orme Bastian thinks that, if proper appliances are developed, there is a big business to be done in this line. Taking electricity consumers to number 1 million, representing a total of 4 million people, and an average of hot water (150° Fahr.) per person of 4 gallons per day, this would represent 16 million gallons. Then assuming an efficiency of 70 p.ct. for the storage heating, which (he declares) can be easily allowed in well-designed water tanks, and assuming the average temperature of the feed water to be 60° Fahr., the heating of this quantity of water would require about 6 million units per day, which, at ½d. per unit, would mean a revenue of about 4½ millions per annum. Why do not the electrical people get this business? In the first part of his article Mr. Orme Bastian gives one reason. "We cannot," he says, "produce and exploit the electrical equivalent of the modern gas geyser, if only for the reason, among many others, that the cost of the house service would be enormously increased, owing to the heavy loading required."

Electrocynic's Distortions.

"Electrocynic" has been writing in the same issue of our contemporary on the recent article of a "Medical Correspondent" in the "Sunday Observer," to which attention has been directed on previous occasions. Towards the end of his article, he advises the latter to refrain from writing on subjects of which he is painfully ignorant. "Electrocynic's" laboured two columns are a fine testimony to the ignorance which he possesses of the subject upon which he has launched out on this occasion. He distorts in places what the "Medical Correspondent" actually said; and it is perfectly patent that his scientific knowledge of heating, ventilation, and the chemistry of gases—waste and otherwise—is remote from the first order. The "Medical Correspondent," it will be remembered, stated that gas-fires possess the dual advantages of giving radiant heat and continuously ventilating the room, and so promote air movement, which prevents the air getting into that condition which occupants of electrically or centrally heated rooms call stuffy, and find enervating. He did not make any suggestion of unhealthiness being due to the single fact that electric heating warms the air of a room; nor did he say that the gas-fire, on the other hand, is the one hygienic method because it gives forth radiant heat, and leaves the air in a state of refreshing "iciness." That is a distortion of his contentions. Then for the ignorance of "Electrocynic." He correctly says that the heat is only "radiant" until it is absorbed by walls, furniture, &c.; but he incorrectly adds that "after that it proceeds to warm the air in the manner to which this observant medico strongly objects." Air that is warmed by the heating of the walls, furniture, &c., in a room is subjected to a low-temperature process of heating; and not by a high-temperature process (such as the contact of air with highly heated substances) that deprives the air of humidity, and is the cause of headaches and other ills which are so objectionable to the human being. Upon the ignorance displayed in this matter rest several other foolish statements in "Electrocynic's" criticism. We get to what are called by him "brutal facts," but which would be more accurately termed "brutal untruths." He says: "The gas-fire consumes the atmospheric oxygen, and produces poisonous fumes, which, if not evacuated, would in time kill or render senseless the inhabitants of a room." How can the gas-fire consume the atmospheric oxygen without the air containing the oxygen being constantly replaced? If it were not, there would in a very short time be a vacuum in the room. As to those "poisonous" fumes, what are their nature and quantity? Had this critic been referring to the products of combustion of a coal fire, we should not have been so ready to dissent from what he says. He proceeds to state: "As a rule, the fumes are not completely evacuated, and partial poisoning takes places, engendering headaches, and, in the case of medical journalists, a habit of inaccurate statement and a temporary suspension of mental activity." Taking the modern gas-fire, this statement from "as a rule" is a piece of concentrated fabrication, which no electrician can possibly prove, and of which most electricians would have been ashamed to have been even the anonymous authors. It is also suggested that an electric-heater will both heat and ventilate. If it does the one, it will not do the other without greatly increasing the expenditure on the electrical energy used. "Electrocynic" apparently thinks that, in places where electric heating is in use, there is nothing to evacuate but "pure air." The room would have to be constantly untenanted to find the air free from pollution. One important matter which he avoids is the question of costs for equal heating. However, what is there in the article that is deemed of sufficient quality to appear in an electrical technical paper? People qualified to judge will place a proper assessment upon it.

"Lest We Forget."

From a Paris message, it is learned that there was a dangerous panic below the bed of the River Seine on Friday, April 8. As a train in one of the Paris tubes was in the middle of the tunnel under the river a short-circuit occurred, and the last carriage (which was crowded) was suddenly surrounded with flames. The coachwork being made of steel, there was no immediate danger. But a fierce struggle quickly started among the passengers, though they were wedged so tightly they could hardly move. Women fainted; men with frantic blows smashed the plate-glass windows to scramble out on the line; and many people were severely cut. Fortunately the stationmaster at the last station through which the train had passed had seen the blaze in the distance and cut off the current. After half an hour the train was towed-out. Suffering from cuts and shocks a number of the people had to be taken to the hospital. They were fortunate that nothing worse happened to them.

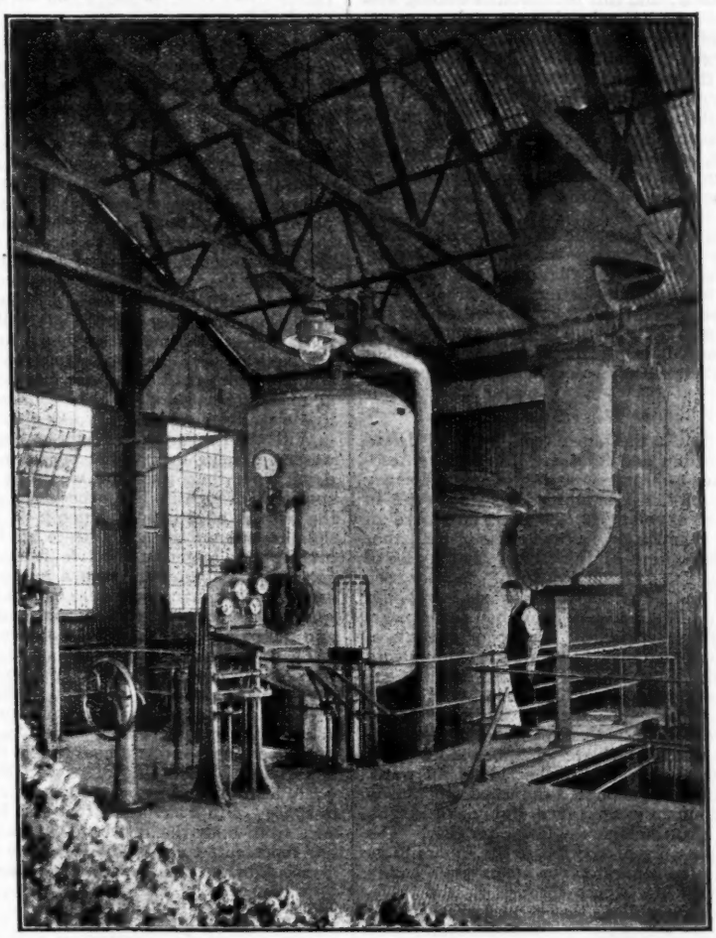
Illuminating Engineering Society.—A meeting will be held at the Society of Arts (John Street, Adelphi), London, at 8 p.m. on Tuesday next, when a discussion on "Ship-Lighting, in Relation to Comfort, Safety, and Efficiency" will be opened by Mr. W. J. Jones.

Aliens and Intermediate Products and Dyestuffs.—The Board of Trade announce that, by notice published in the "London Gazette" for April 8, the provisions of section 11 of the Aliens Restriction (Amendment) Act, 1919, which imposes restrictions on the acquisition by former enemy aliens of certain kinds of property, have been applied to the following industries—namely, the manufacture of synthetic organic dyestuffs, colours, or colouring matters, and the manufacture of organic intermediate products used in the manufacture of synthetic organic dyestuffs, colours, or colouring matters. The effect of this is to make it unlawful for any former enemy alien to acquire, either in his own name or in the name of a trustee, any interest in the industries in question, or any share or interest in a share in a company registered in the United Kingdom which carries on the industries.

CONSERVATION OF WASTE HEAT IN GAS-WORKS.

Experiences at Brentford and Southall—Incandescent Coke Direct into Water-Gas Generators—Complete Gasification with Two Separate Plants—Humphreys and Glasgow Waste-Heat Boilers.

A profitable afternoon has been spent by the writer, in company with the Engineer (Mr. A. A. Johnston), on the Brentford and Southall works of the Brentford Gas Company. A great deal of late has been heard about the exploration for economy of gas-works processes and practices; and the bringing of it into account, particularly the waste-heat, of which in gas-works there is all told a considerable quantity. At both the works were seen practical applications and developments having for their object to secure as much of the waste heat as circumstances reasonably allow. Mr. Johnston is very enthusiastic about this new phase in gas-engineering practice. And he has good cause to be; for his experience points to profit, and to possibilities of no mean order. This is no new aspiration born of modern technical advocacy, because at the Brentford works there has been running from pre-war days a waste-heat boiler on coal-gas settings; and only the intervention of the war has caused delay until recent times in extending, and providing for still further trial of, the system. Now the work is going along with good swing, as will be seen as the story is told of what was witnessed and gathered during the inspection.



ONE OF THE HUMPHREYS AND GLASGOW WASTE-HEAT BOILERS AT SOUTHALL.

Complete Gasification with two Separate Plants.

An outstanding development to which attention must be first directed is a combination of coal-carbonizing and blue water-gas plant. Here we have an innovation; and Brentford among gas-works leads the way. The largest source of waste heat on a gas-works is unquestionably in the spent charges, which as a rule have valuable potential heat ruthlessly quenched from them. How to save at any rate part of this is the problem that has been attacked; and the solution is seen in one of the inclined retort-houses at the Brentford station. The Company years ago pinned their faith to inclined retort-settings; but it is noticed that time has brought its changes, and in reconstruction work horizontal retorts are again being adopted with modern methods of operation.

But in the particular inclined retort-house at Brentford which principally engaged interest, immediately facing one end of the bench (only 15 ft. separating them) is a 750,000 c.ft. Humphreys and Glasgow blue water-gas plant; and this generator is fed direct with incandescent coke from four settings of 24 retorts, carbonizing 30 tons of coal per day. The coke from the top retort is used for feeding the producers of the settings. From the other retorts the incandescent coke for feeding the water-gas generator passes into skips of 7 cwt. capacity. The skips (which run along rails in front of the settings) are raised and carried by a telpher to a hopper with a shoot to the generator; and on opening the bottoms of the skips, the incandescent coke is discharged direct into the generator. The operation was timed. From the loading of the skip to the deposit of its load in the generator, less than a minute passed; so that, practically speaking, the incandescant coke enters the generator at the high temperature at which it leaves the retort. In this short space of time, there is not much opportunity for heat loss from the mass of coke in the skip, or during its discharge into the generator. Blue water-gas plant working in this direct relation with coal carbonizing retorts, represents the first trial by Mr. Johnston of such a combination on this scale. In a retort-house of the size of this one, his ideal of what should be for dealing with the whole of the coke would be to have a blue water-gas plant at either end, and in the middle a carburetted water-gas plant. This would give elasticity in production and quality that would enable an engineer to comply with any conditions which the day brought upon him.

This combination of plant—combined solely for the purpose of saving the heat resident in the spent charges from the retorts—has only been running since last December; and it is at present impossible to give exact figures as to its working, as there are not in existence any means for separately measuring the gas from the blue water-gas plants—the gas from it at present being simply delivered direct into the coal-gas system. Calculated figures could be given; but the time will come when, better still, figures that will be exact, and so more acceptable, will be available. A Kent Venturi meter is going to be installed to measure the blue water gas, and this will, at any rate, supply approximate information as to what the plant is doing. With the gas entering the coal-gas system as now, calculated results might, of course, lead

to wrong conclusions, inasmuch as variations in the make of the coal or water-gas plants might be attributed to wrong causes.

Telpher and Hot Coke Conveying Plant for Combination Plants.

It will have been noticed that the skips carrying the incandescent coke from the retorts to the water-gas generator are handled by a telpher arrangement. At Southall, owing to the disposition of the water-gas plant in relation to the carbonizing plant, the coke is dealt with by a hot-coke conveyor. The former system is much preferred by Mr. Johnston, for this reason: The spent charges are drawn directly into the skips, and the incandescent coke is passed at once in the large state into the generator. There is no breeze made, and therefore there is no waste. The whole of the fuel is used; and thus there is complete gasification of the original coal, with the minimum loss of heat. That is the aim, successfully accomplished, in this combination of separate plants, the bridge between which is the telpher. And, moreover, there would be no steam and no flying dust and fumes from coke quenching in a retort-house completely worked on this system.

While dealing with this point of hot coke transfer to generator, it may be mentioned that later it was seen at the Southall works that it would have been impossible to erect the water-gas generators within the existing retort-houses, and so they had to be put at the end of one of them; and this necessitated dealing with the fuel for the generators by a hot-coke elevator and conveyor. This means the making of 5 to 8 p.ct. of breeze, and the coke is broken down to some extent, which renders it less suitable for water-gas making than is the case under the new plan at Brentford with the telpher system, and the proximate situation of the two plants. Even this system is not ideal. What Mr. Johnston would like would be to have the retort-bench at such a height that the incandescent coke, on being discharged, would fall direct into the generators. But this would not be practicable. So many generators would be required that this alone at once puts the idea out of court.

This being a new system of working, the Engineer and his staff have to some extent had to feel their way. Trial and experience improve practice; and the next installation of the kind that Mr. Johnston makes will be in details better than the first one. The main thing is that the heat of the coke is saved, and is put to profitable use for gas making. Nor is there dumping of cold material into the generator. It is obvious that fuel and labour are saved, and that the thermal efficiency of gas-making is increased.

The Humphreys-Glasgow Waste-Heat Boiler.

It may be remembered that in the paper read by Mr. Edward G. Stewart, before the London and Southern Junior Gas Association last March, he gave information as to the heat efficiency of the waste-heat boiler of the Humphreys-Glasgow type in connection with the water-gas plant at the Fulham works of the Gas Light and Coke Company. In the course of the paper he supplied a succinct description of the boiler. It may be of interest here, before proceeding with the account of what was seen at Brentford and Southall (not forgetting that a waste-heat boiler was in use at Brentford on the coal-gas plant before the war) to quote from Mr. Stewart's description. The boiler consists of two parts. The water drum is an upright cylinder, standing with a slight incline backwards, divided into top and bottom gas chambers, which are connected through the middle or water chamber by over 200 3-in. tubes. The water is on the outside of the tubes. The steam-drum is a smaller vertical cylinder connected by a branch to the side of the water chamber at its upper end, and by a vertical stem and branch to the side of the water chamber at its base. Upon it are mounted the usual Hopkinson boiler fittings of water and steam gauges, feed, stop, dead weight, and spring safety valves; also the high and low water gear. The boiler delivers steam at a pressure of 100 lbs. to the square inch. After giving-off a branch to the generator, the steam-main enters the principal steam-main of the works through a stop-valve. From the top gas chamber, connections lead right and left to the stack-valve and to the washer and outlet main respectively.

In the foregoing, 100 lbs. pressure is mentioned; but in certain other cases the boilers are working at 120 lbs. pressure—in fact, they can be made to give any pressure desired; it is simply a question of the strength of the water-boiler tubes.

The point of interest, however, is that using the waste heat from blue water-gas plant, the boilers make enough steam to supply all the requirements of the generator and the blowing plant, with a surplus. This makes a water-gas plant absolutely self-contained, and saves fuel and labour, through former waste heat—the sensible heat of the blue water gas and blast gases, as well as any heat of combustion that was lost—being utilized. The whole arrangement is so simple that the marvel is that it has not been adopted before.

By the system of completely gasifying in two separate plants, it is contended that the processes of coal carbonization and water-gas production are kept under better control than would be the case in an ordinary complete gasification plant, and so the highest efficiency should be realizable from each plant, if waste-heat boilers are employed.

Good Evaporating Duty.

There is one of the Humphreys-Glasgow waste-heat boilers at Brentford, and two are at Southall. As will be remarked later, the plans include the installation of others at Southall, which is the best possible attestation of good experience.

It has already been mentioned that the new blue water-gas plant at Brentford is making about 750,000 c.ft. of gas a day. Approximately, 40 lbs. of coke are used per 1000 c.ft. of gas produced; and 90 lbs. of water are evaporated per 1000 c.ft. The temperature is reduced in the boiler combustion chamber from 1300° to 1400° to about 400° to 490° in the stack-valve; so that some 800° to 900° are taken out of the waste gases and the water gas. The equivalent of 70 lbs. of steam is used on the plant itself—for gas making, and the blowers and pumps. Therefore, there is a surplus of 20 lbs. of steam per 1000 c.ft. of gas made, which surplus is run into the works' ordinary steam system.

This shows what can be done on a ¾ million (or thereabouts) blue water-gas plant; and the two Southall 1½ million plants give corroboration. At the Brentford works (which are cramped and undergoing reorganization, all with the view of increasing productive capacity, and effecting monetary economies in working), there are also three sets of carburetted water-gas plant, each having a capacity of 1 million c.ft. It is clear that, when opportunity serves, the waste heat of these carburetted plants will not be allowed to escape being brought into account. As a matter of fact, waste-heat boilers are already being used elsewhere on large carburetted plants. By the way, the Brentford Company rely very largely on water gas. There is regular working to rather more than 40 p.ct.; and the proportion has on occasion reached 60 p.ct.

Waste-Heat Boiler on the Coal-Gas Plant.

It has been mentioned that some years ago—before the war in fact—Mr. Johnston adopted a waste-heat boiler in connection with one of his retort-houses at Brentford; and he is intending to incorporate waste-heat boilers whenever the opportunity occurs. By this boiler—a veteran in work—the temperature of the waste gases is reduced from about 900° to 400°. By a T arrangement, when the boiler is out of action, all that has to be done is to drop a damper. Experience has to be gained by trial. When the boiler was first put in, it was anticipated that it would deal with the waste heat from the 16 settings that there are in the house. But now, through the lack of draught, it deals only with the heat from half the number—viz., eight settings. If there was room for a second boiler, one would be installed to deal with the waste heat from the other eight. The boiler, which has an automatic feed, delivers the steam produced to the ordinary boiler plant. It requires very little attention; and if the whole works were equipped with the boilers, one man could easily go round to them all to keep them going. They only need looking at now and again to see that their feeds are working correctly.

With the heat from the eight settings, from 2600 to 2900 lbs. of water are being evaporated per hour. The boiler is capable of doing more than this, and would be doing more had there been sufficient draught. The experience gained suggests that to use the system effectively a number of boilers are required rather than to attempt to concentrate all the heat at one point. In other words, to get an effective distribution of heat in the retort-settings, it is better to have a number of boilers in the line of retorts rather than only one. Unless there is a very big chimney with such a boiler, draught is lost, and at one end of the settings, and the balance of heat is completely upset.

These waste-heat boilers (which require the minimum of attention) do away with the ordinary boilers, which require a good deal of manual labour. This one boiler on eight coal-gas settings supplies a quantity of steam equal to about two-thirds the capacity of one of the ordinary boilers on the works. Mr. Johnston thinks so much of waste-heat boilers that he intends taking every opportunity of adopting more. In his opinion, there is enough waste heat on a gas-works to generate all the steam needed—and to spare—with a saving of fuel and labour. There is the waste heat from both the coal and water-gas plants; and, combined, this represents considerable economy in fuel, which fuel is left at disposal for the purpose of making water-gas.

Heat Conservation at Southall.

From the Brentford works, a visit was paid to Southall, where a large amount of reconstruction work is also being done; and preparation is being made for still further utilization of waste heat. In No. 2 retort-house, horizontal settings are being installed with Drakes' machinery, the steam for driving which is to be generated by the waste heat of the settings. Thus the settings will provide their own power agent. Ultimately the waste heat from No. 3 house will be brought to the boilers in No. 2 house.

With No. 5 retort-house, two waste-heat boilers are being connected-up, the steam from which will be used by carburetted waste-gas plant. In this house there will be 25 settings of eights. The house will be divided in the middle; and boilers will be centrally placed for each bench.

No. 4 is an enclosed retort-house, and this is the one that works in conjunction with the blue water-gas plant, of which there are two sets, each of 1½ million cubic feet capacity. But in this connection there can be no direct transfer of the incandescent coke to the generators. Circumstances compelled their location at one end of the house, and the use of a hot-coke conveyor. The coke as it is delivered to the generator is not cold, but it is cooled down (and looks it) during its travel by the conveyor, and so is not so hot as it might be. At the hopper the breeze has to be removed; and it runs between 5 and 8 p.ct. Looking back at the Brentford plan—the incandescent coke going into the gene-

rator, no waste of fuel, and the rapid transfer by telpher—it appeals to us as from all points of view the preferable system, promoting as it does the maximum heat and fuel economy.

Here we have two fine specimens of the Humphreys and Glasgow waste-heat boilers, which make the blue water-gas plant self-contained. The boilers do not occupy much space considering the duty they render. They provide, by the heat that under the old conditions would have been wasted, steam sufficient for the blue water-gas plants, with a surplus for other plants. We cannot contemplate this fact without thinking again of the extraordinary waste of heat that there has been in the past.

This was an interesting and highly instructive visit; and acknowledgment for much information is due to Mr. Johnston, and to his two chief technical assistants—Mr. R. Goodman at Brentford, and Mr. F. H. Morris at Southall.

THE "SYDENHAM" GRATE.

Clinkering Work Reduced and Saving of Fuel.

War produces many romances; but who would ever associate romance with a furnace grate? Yet the "Sydenham" grate is a romantic product of the late war! We had better explain. When the urgent call of the Army thinned the civilian ranks of men workers, it is common knowledge how patriotically women stepped into the breach. Among the many duties they undertook, not the least arduous was that of gas stoking; and many were engaged to perform this duty at the Lower Sydenham works of the South Suburban Gas Company.

Hard as is the ordinary work of gas stoking, it is rendered doubly so when to it is added the removal of heavy clinker; and what gas engineer has not had at one time or another to face this trouble? Heavy work for a man, but nevertheless cheerfully faced by the women at Lower Sydenham. But the chivalrous feelings of the engineering staff were roused to action; and, led by the then Chief Engineer (Mr. S. Y. Shoubridge) and his able assistant Mr. F. G. Gorman, they set to work to devise a grate that would materially lessen the work of clinkering. Their skill proved equal to the occasion. In fact, their efforts exceeded expectations. As a result of several months' experiment, a grate—now called the "Sydenham" grate—was devised. Clinkering became a thing of the past, even when using the worst Durham coal; the pricking of the fire at intervals and the removal of the ash being all that was necessary. Considerable saving in coke consumption and maintenance was effected. No false bars were required. Regular heats were maintained over long periods; and moreover no steam was necessary. The grate has now been in operation at the Lower Sydenham works for more than three years; and we understand it has been decided to replace all the existing grates with this new type.

Having regard to the success of the grate, it was thought that the undoubted benefits to be derived from its use should not be confined to the South Suburban Gas Company. Arrangements have therefore been made with the Vertical Gas-Retort Syndicate, Ltd., to place the grate (a patent for which has been applied for) on the market. Gas undertakings desiring further particulars and information should therefore communicate with the Syndicate, No. 17, Victoria Street, S.W. Already, we learn, several orders have been placed, after inspection of the grate in use.

Best Efficiency Test with Coke for Steam-Raising.

In a test made by the Gas Light and Coke Company, at Beckton, to determine the best efficiency which could be obtained with a Lancashire boiler fired with large coke and fitted with "Turbine" furnaces, the following results were established: The boiler is 30 ft. long by 8 ft. in diameter, and has eight cross tubes. The grate area is 27·5 sq. ft. The draught produced by the chimney during the test amounted to 0·1 in. in the side flues; while the steam-jets under the bars provided a pressure of 0·45 in. The fuel was large coke, containing about 10·5 p.ct. of ash. The test was carried on for six hours, during which 3900 lbs. of coke were consumed and 39,725 lbs. of water evaporated. The average steam pressure was 77·6 lbs. per sq. in., the feed temperature 50° Fahr., and the flue-gas temperature 972° Fahr. while the gases contained 18·3 p.ct. of carbon dioxide. The fuel consumption works out at 8·14 lbs. of water per pound of coke, as fired, or at 9·8 lbs. of water from and at 212° Fahr. The inventors and patentees of the furnace are the Turbine Furnace Company, of Budge Row, E.C.

Among wills recently proved is that of the late Mr. Alfred T. Harris, of Market Harborough, whose death was recorded in the first number of the "Journal" published this year, who left estate of the gross value of £2637. Mr. James Keith, of Keith and Blackman, Ltd., who died in February last, left property valued for probate at £107,630 net. Mr. J. C. im Thurn, a Director of the Primitiva Gas Company of Buenos Ayres, Ltd., has had his estate valued at £62,558 net personalty. Mr. Thos. G. Reah, colliery owner of Newcastle-upon-Tyne, left £45,343.

THE GAS AND CHEMICAL INDUSTRIES IN WAR.

The British mission, appointed in February, 1919, to visit German chemical factories in the occupied area, have presented their report; and it has been issued by the Army Council. It points to the necessity for this country possessing a highly organized chemical industry for war purposes. We may add that it would not do to depend upon a highly organized chemical industry, without flourishing industries for the supply of important basic materials. The report says it is doubtful if the efficiencies in any German works reached the very high levels which were attained during the war by the best English factories. One striking feature was the fact that the bulk of the plant employed for the production of poison gas had been in existence prior to the war for the manufacture of dyestuffs or pharmaceutical products.

"No arrangements appear to have been made prior to the outbreak of war to utilize the resources of any of the German dye factories for war purposes. After the battle of the Marne the Government realized the need for expanding the output of explosives, and most of the chemical works were producing small quantities by the end of 1914. The demands made on them increased during 1915; but it was not until 1916 that plant was laid down to assist in the enormous production of explosives required by the Hindenburg programme. Most of the big extensions of the synthetic ammonia and of the nitric and sulphuric acid plants date from that time; many chemists being released from the army, and the scientific staff of some of the works being augmented. Standardized plant used for the manufacture of dyes was converted for the production of explosives with remarkable speed; for instance, at Leverkusen a T.N.T. plant producing 250 tons per month was put into operation in six weeks.

"As regards poison gas, at first chlorine and phosgene were the main requirements, but afterwards a variety of organic substances were employed. Many of these substances were new, and difficult to prepare, and rapid production was only possible owing to the speed with which the peace organization of the dye factories could be utilized for this purpose. When the Government wished to introduce a new gas, a conference of the various firms was held at Berlin, to determine how the manufacture should be subdivided in order to use existing plant to the best advantage. For instance, the initial stages of the manufacture of mustard gas were carried out at Ludwigshafen and the final stage at Leverkusen."

The report gives statistics of the output of explosives and gas; and these show the great military value of the German chemical factories. In future every chemical factory must be regarded as a potential arsenal, and other nations cannot, therefore, submit to the domination of certain sections of chemical industry which Germany exercised before the war. For military security, it is essential that each country should have its chemical industry firmly established.

"The key to Germany's war production of explosives was the Haber process for the production of ammonia from atmospheric nitrogen. It is significant that large-scale production by this process only began at the end of 1912, and that in the early part of 1914 great pressure was put on the Badische Company to increase its output. During the war, owing to the extensions of the Haber plants at Oppau and Merseburg, Germany has become independent of foreign countries for her supplies of ammonia and nitric acid—substances indispensable for the manufacture not only of high explosives but also of fertilizers for food production. Without such a process Germany could not have made the nitric acid required for her explosives programme, nor obtained fertilizers for food production after the supply of Chile saltpetre had been stopped by our blockade; and it is probable that she could not have continued the war after 1916. In the event of another war we might be cut off from supplies of saltpetre while Germany would be independent of them.

"The resources of the German dye industry are of no less military importance. Most of the gases employed towards the end of the war were complex organic substances, none of which had been made previously except in small quantities, and some of which were prepared for the first time during the war. Gas warfare will undoubtedly continue to develop in this direction, and in future organic substances will be employed which we do not know to-day. The use of gas will always offer great opportunities for surprise in military operations, and the experience of the present war has shown that rapid production of a new gas is essential if the surprise is to be effective. Any country without a well-developed organic chemical industry will be severely handicapped in this respect."

The main source of the strength of the German chemical industry appears to lie in its organization and in the large scale of its production, which had been made possible by the ample financial support it had received. By means of these advantages Germany was able to cheapen production, and establish a strong economic position, and to secure the development of the industry by the large sums devoted to technical research. However, the rapid growth of the British chemical industry during the war proved that it could compete successfully with Germany provided that reconstruction was on a scale sufficiently large.

The employees of the Tawe Valley Gas Company have presented Mr. Frederick Shewring with an oak chimney clock, on his leaving there to become Manager to the Stratford-on-Avon Corporation Gas Department.

On vacating the position of Assistant Manager of the Scunthorpe Gas-Works, Mr. H. Turnbull received handsome gifts from the Council officials and the workmen. Mr. Turnbull has been appointed Manager of the Cleator Moor Gas-Works.

AN AMERICAN GAS PURIFICATION INVESTIGATION.

By W. A. DUNKLEY and C. E. BARNES.

(*Continued from p.* 29.)

PURIFIER OPERATION.

Uniformity of Load.

Granted adequate purifying equipment, the purifying efficiencies realized will depend much upon how the equipment is operated. First, the handling of the load may well be considered. The hourly rate of gas output from a plant is, of course, out of the control of the gas manufacturer. He must supply the demand as needed. For the sake of safety, to tide-over any accident to the gas-producing equipment, it is usually considered necessary to keep the gas storage holders at all times as nearly full as possible. If the storage capacity is much undersized, in order to make good the output it may be necessary to purify the gas almost at the rate of output during certain hours of the day. This may necessitate purifying the gas during such times at a rate much in excess of the rated purifying capacity. Even so, it may be possible by attention to smooth-out the production curve somewhat. Fig. 2 shows the output and production rates in a typical water-gas plant operating 24 hours per day. The rated capacity of the purifiers and the average hourly make are shown by horizontal lines. It will be noted that the hours of large production do not always coincide with the hours of large output. The production curve crosses and recrosses the line of average production not only when the production is near the average for a considerable time, but also when for some time it is averaging considerably above or below the general average. By careful attention to the rate of pumping gas, these wide fluctuations could probably be prevented to a considerable extent, with benefit to purifying operation.

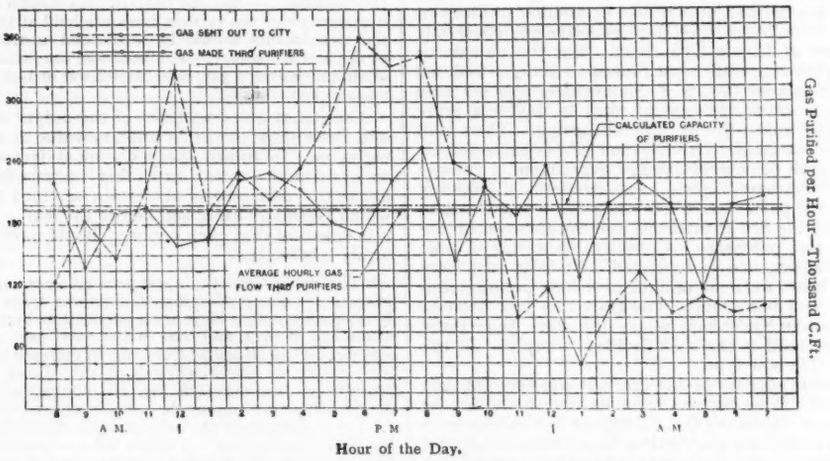


FIG. 2.—DISTRIBUTION OF LOAD IN A TYPICAL WATER-GAS PLANT.

Temperature Control.

Temperature control is another important consideration in purifier operation. Both excessively high and excessively low temperatures at the purifiers should be avoided. The statement is often made that at low temperatures (below about 60° Fahr.) the sulphiding reaction becomes sluggish. That there is some difference of opinion relative to the effect of temperature on the purifying process, is indicated by the fact that this matter is now being studied by the Purification Committee of the American Gas Association. A temperature of about 100° Fahr. is usually thought to give the best results; and often it is considered important that the temperature be kept up in winter by artificial means if necessary. Formerly it was the practice to have the purifiers installed indoors; but the high cost of building construction as well as successful experiments with outdoor purifiers have resulted in a rapidly increasing number of outdoor installations. Practically all the new installations are of the latter type. Where the temperature of the gas has a tendency to fall in winter much below the temperatures above stated, it can usually be kept up by the installation of steam-coils in the purifiers or by the injection of steam into the gas ahead of the purifiers. The latter practice may be questioned by some operators on account of the amount of moisture which is deposited in the purifying material, while the former may be open to objection on the ground that it dries-out the oxide too much. Some outdoor installations are insulated so as to diminish the drop in temperature during cold weather, but this is not common practice—at least in Illinois.

While a fairly high temperature is usually considered advantageous in its effect on the sulphiding reaction, the temperature of the gas throughout the condensing and purifying system should not be maintained too high, lest difficulty be experienced in extracting the tar. A temperature much above 100° Fahr. at the inlet to the purifiers, if maintained by the original heat in the gas as generated, would usually necessitate a temperature considerably in excess of this back at the tar-extracting equipment. It is usually considered that 100° to 110° Fahr. is about the highest temperature at which tar can be extracted efficiently by most forms of tar extractors, though opinion may vary on this point. During the writer's inspection trip to various Illinois plants, several cases were observed where the temperature at the inlet of the purifiers was around 120° to 130° Fahr.; but in practically every such instance there was an excessive amount of tar being carried into the purifiers. Probably the best results will be obtained by maintaining a temperature of 90° to 100° Fahr. at the boxes, and keeping the gas saturated with water by the admission of steam to the gas, or otherwise.

Revivification.

As previously mentioned, the greatest advantage of hydrated oxide of iron as an absorbent for hydrogen sulphide lies in its ability to revivify or regenerate when, after sulphiding, it is exposed to the oxygen of the air. Naturally the first method of revivification adopted was to remove the sulphided material from the purifying box and expose it to the air. The appearance of the material, as it changes from the black iron sulphide to red or brown iron oxide, is of course a guide to the operator by which he can determine with more or less certainty when the material is reoxidized and ready for use in the purifiers again. The usual procedure in revivifying out of doors is to put the material in piles or windrows, perhaps two or three feet high. When the material begins to heat as a result of the oxidation process, it is raked down into a layer a foot or so in thickness; and as the surface reddens, the whole mass is turned-over by shovel—this operation being repeated until the mass is of uniform colour and no longer heats. This process, simple as it seems, requires considerable attention. The material frequently oxidizes very rapidly upon removal from the purifiers; and when it contains a considerable percentage of iron sulphide, it is likely to ignite—especially if in a deep mass from which heat cannot escape readily. Overheating is detrimental to the further value of the material, rendering it inactive. At the same time, a moderate degree of heat promotes the oxidizing reaction without injuring the material. The operator therefore usually cools hot spots in the material by shovelling them out, and exposing the hot material to the open air, which rapidly cools it, rather than by the application of water, which cools the material to such an extent as unduly to retard the revivification. This method of revivification involves much handling of the material. Indeed, since it is not possible to leave material in the boxes until it is completely sulphided, it is usually necessary to handle it a dozen times or more to get a very good sulphide content. But since the sulphiding and revivifying reactions slow-down greatly after a time, the cost of handling the material may soon offset the value of the work it is doing. Consequently, material is frequently discarded long before it contains 50 to 60 p.ct. of sulphur, which is considered good operation.

Naturally, gas operators looked for a method of revivifying which involved less handling of oxide, and revivification in place was the outcome. Two methods are in use at the present time—(*a*) introduction of a small percentage of air (1 to 2 p.ct.) into the gas ahead of the purifiers, and (*b*) blowing or drawing air through a box of material which has been shut-off from the remainder of the purifying system. Each of these methods of revivification has its advantages and disadvantages, and there are some details of operation in both cases on which operators disagree.

One advantage of the first method is that it involves no danger and requires little attention. The air-pump is connected to the exhauster and pumps more or less air as the exhauster runs faster or slower. One obvious disadvantage of the first method is the amount of inert nitrogen which is introduced into the gas, if an attempt is made to employ air enough to secure complete re-

vivification in place. Although less than 0·5 p.ct. of air would theoretically be required to accomplish the revivification of an oxide which was being fouled with gas containing (say) 100 grains of H_2S per 100 c.ft., as a matter of fact even 2 p.ct. does not completely accomplish the revivification. Excessive nitrogen of course dilutes the gas and requires additional enrichment, especially if the gas is made to conform to a candle-power standard. With the heating-value standard which is fortunately rapidly replacing the candle-power standard, this effect is not so serious. The differences in operation found in different plants with this method of revivification relate chiefly to the reversal of direction of gas flow and the order of the purifiers with respect to the condition of the contained materials. These will be discussed in the next section.

Revivification by forcing air through a box of oxide after shutting-off the gas has been employed in various plants for a number of years, is heartily approved by many operators, and as heartily condemned by others. Its advantage lies in the fact that no nitrogen is admitted to the gas. On the other hand, careful attention has to be given to it while in progress; and in some circumstances it may be dangerous. Mr. O. B. Evans,* of Philadelphia, recently presented a paper before the American Gas Association, in which the experiences of several companies in the use of this method are given. From these experiences he concludes that revivification by this method is a simple operation when the purifying capacity is ample and revivifications are frequent; but with overloaded purifiers extreme care must be used to prevent the firing of the oxide. He believes the best method is to recirculate air (which soon becomes chiefly nitrogen, since the oxygen is soon removed by the purifying material) continuously through the box and through a cooler of the contact type, in which it comes in contact with water. The water keeps the recirculated mixture saturated, and the water vapour helps to keep down the temperature of the oxide. An arrangement of valves is made whereby a small amount of fresh air can be admitted to the circulation, and a similar amount of inert gas expelled from it, as desired. The blower should be of sufficient capacity to reduce the channeling effect and to circulate the mixture faster than the rate at which gas is passed through the box during operation. He states that shallow boxes aid considerably in successful revivification in place, on account of their greater radiating capacity per bushel of oxide. With these methods Mr. Evans believes that revivification can be carried out without danger, channeling and excessive local heating being largely avoided. The successful experiences of many operators over a number of years confirm this.

Reversal of Gas Flow and Rotation of Boxes.

Reversal of direction of gas flow through the purifiers and the order of the various purifiers with respect to the condition of the contained oxide, are matters of considerable importance in connection with revivification in place. In both these matters the operator may be limited by the arrangement of his equipment. Not all plants are so arranged that the direction of gas flow in a given box can be reversed; and while a certain amount of latitude is usually allowed as to the order of purifying boxes, one finds a number of cases where the connections are so arranged that the possible number of combinations is small. Obviously, any group of purifiers must be so connected that any box can be shut-off for refilling. In most of the older installations, when one box is off, the order of the other boxes is predetermined, only one arrangement being possible. Reversal and rotation, as applied to revivification in place, depend upon the principle pointed out several years ago by B. E. Chollar—that iron sulphide will not revivify to oxide in the presence of hydrogen sulphide. Let us assume (as is frequently the case in new purifier installations) that the gas enters at the middle of the box and passes downward and upward through the two layers of oxide, and comes out at the top and bottom of the box. The lower layer will sulphide downward, and the upper layer upward. If when the sulphiding has extended (say) half-way through each layer, the direction of flow be reversed, so that the gas enters at the top and bottom of the box and leaves at the middle, then the comparatively fresh oxide in the top of the upper layer and the bottom of the lower layer will remove the H_2S from the gas, and any oxygen present will go on and revivify the foul upper part of the lower layer and the lower part of the upper layer. The frequency of reversals will depend upon the degree of loading of the purifiers. Where the purifiers are being operated at normal capacity, reversal once a week is often advised. With an overload, it might be advisable to reverse oftener.

Box rotation is another means to accomplish the same end. Where there are three or more boxes in series, it would seem logical to have the clean box first to remove the H_2S and the fouler boxes after, to be revivified by the oxygen which had been admitted to the gas. The following are suggested orders of rotation of a four-box set, the changes being made when H_2S appears at the outlet of the third box:

1 — 2 — 3 — 4
4 — 1 — 2 — 3
3 — 4 — 1 — 2
2 — 3 — 4 — 1

In this way the most revivified batch is placed first, and the next cleanest batch is always the last to take up any traces of H_2S which may get in by the previous batches at any time.

Where there are only two boxes in series, especially those of the non-reversing type, it would hardly seem advisable to have the clean box first, since the failure of the second box to revivify for any reason would leave no active material to intercept traces of hydrogen sulphide.

As stated earlier in this section, there is no method of procedure in the matter of revivification in place, accepted as best practice by all operators. The only way by which any operator may arrive at a satisfactory conclusion is to try various methods and arrangements and satisfy himself which method is most applicable to his particular plant.

Chemical Control and Records.

In order to secure and maintain good purifying efficiencies, it is important that the operator knows at all times the status of the material in each one of his purifiers. Knowing this, he will not only be able to judge whether his method of operation is satisfactory, but he will be able to detect differences in purifying material which might otherwise be obscured by other conditions. The extent of the system of tests and records maintained will, of course, depend, among other things, upon the size of the plant and the force available. Practically every plant makes the simple lead acetate paper test; but this is merely qualitative. It tells of the presence or absence of hydrogen sulphide, but gives little information relative to the amount present. The total-sulphur test carried on under the requirements of the Public Utilities Commission (at least in the State of Illinois) gives information only with respect to the amount of sulphur in all forms present in the finished gas, but gives no information in regard to the performance of the individual purifiers.

The introduction several years ago of the Tutweiler hydrogen sulphide burette marked a distinct advance in the matter of checking purifier operation, because it gave the gas operator a simple, easy method of studying his purifier performance without the aid of a trained chemist. Unfortunately, the apparatus has to be made of glass, and is so shaped and proportioned that it is easily broken; and, further, unless care is taken to remove the plugs of the glass stop-cocks and to insert pieces of paper round them after using, they are very liable to become hopelessly stuck in a short time. Nevertheless, with reasonable care the apparatus can be kept in good order, and the information obtained with it is very useful. One advantage of the instrument is the short time required to make a series of determinations. Probably after a very little practice any operator, even with no chemical training whatsoever, could make a test in fifteen or twenty minutes of the gas entering the first box and leaving each box of a four-box series. By simple subtraction of the number of grains of hydrogen sulphide found at the outlet of each box from the amount present at the inlet, the amount of sulphur being removed by each box would be immediately known. The results of a test on a certain day might be as follows:

		P.Ct. of H_2S Removed.
Grains H_2S before boxes	100	
,, ,, after 1st box	25	75 by 1st box
,, ,, ,, 2nd ,, ...	10	15 ,, 2nd ,,
,, ,, ,, 3rd ,, ...	5	5 ,, 3rd ,,
,, ,, ,, 4th ,, ...	0	5 ,, 4th ,,

Now 5 grains of H_2S after the third box could probably be detected by lead acetate paper as ordinarily used, and would perhaps ordinarily be taken as a sign to change the order or empty a box; but if this same distribution of work continued for several days, and the remaining few grains of H_2S were absorbed in the last box all right, it might be well to retain this order for a time, since a larger absorption in the first box would be accumulating. A considerably greater sulphur absorption might be realized in the first box than would be obtained if it were emptied or reversed as soon as a trace, as shown by lead acetate paper, was visible at the outlet of the third box. Steere states that 20 to 50 grains of H_2S may be safely passed to the last box if tests are made regularly, and the boxes are properly proportioned. He would allow 20 additional grains to pass to the last regular box, where a catch-box is provided. On the other hand, let us assume that the following results were shown by the tests:

		P.Ct. of H_2S Removed.
Grains H_2S before boxes	100	
,, ,, ,, 1st box. . . .	80	20 by 1st box
,, ,, ,, 2nd ,, ...	20	60 ,, 2nd ,,
,, ,, ,, 3rd ,, ...	5	15 ,, 3rd ,,
,, ,, ,, 4th ,, ...	0	5 ,, 4th ,,

It would at once be evident that box No. 1 was not doing its share of the work, since if it were in good condition it could usually be expected to do at least 60 p.ct. of the total absorption. It would be evident that box No. 2 was bearing the chief burden; and it would be high time to empty No. 1 or reverse so that it would clear up.

If such tests as the above were made faithfully day after day, and carefully recorded in a book (not on loose scraps of paper), it is evident that a running record could be maintained from which, knowing the amount of gas metered per day, the actual number of grains of H_2S absorbed by each box from change to change would be known. Knowing the number of bushels of oxide in each box, the volume of gas passing in a given time, and the number of grains of H_2S absorbed by each box per 100 c.ft. of gas passing through, it would be very simple to calculate with a reasonable degree of accuracy the number of pounds of sulphur

* See "JOURNAL," Vol. CXLVIII., p. 726.

absorbed per bushel. Such results would be of far greater value in determining the relative merits of various operating methods, or of various oxides, than would the usual record of gas purified per bushel between changes, because unless tests are made there is no way of knowing what proportion of the purification should be credited to each box. Usually, the first box is credited with all the purification, on the theory that in the long run each box will be similarly credited, and will average-up; but during this same time the sulphur content of the gas may change, or more or less tar may be carried forward, affecting sulphur absorption so that the actual performance may be entirely obscured by other conditions.

As a final check on operation, analysis of the oxide for sulphur and tar after each removal from the box, and especially before discard, would be very helpful. Often a batch of oxide is discarded when it is still capable of doing much useful work, and perhaps even more often a batch is returned to the box at considerable expense of handling when it might better have been discarded. Even the trained eye may sometimes be deceived in judging oxide, especially if it contains some tar. In a paper by Fulweiler and Kunberger, a method for determining mathematically whether a given batch of oxide is worth using again has been developed. The formula used is given in Appendix B. It will be observed that no knowledge of higher mathematics is required, though one does need to know what the batch has done in the past and what it is capable of doing as judged by a simple laboratory test. If the operator were in possession of the facts derived from the running record of tests above described, together with certain costs which he should know for the intelligent operation of his plant, it would not be difficult to use the formula, provided he could make or have made an analysis of his oxide and a laboratory hydrogen sulphide absorption test.

The writers of this paper do not advise every gas company, large and small, to maintain a chemical laboratory and a trained chemist. The small companies probably could not afford these refinements. The large companies already have them, and know their value. We will not attempt to prescribe the minimum size of plant that can afford a laboratory. However, many of the smaller plants in this and other States are linked in a chain of plants. It would seem feasible for a chain of several plants to maintain a laboratory and a chemist, to whom samples of oxide, ammonia, and other materials could be sent for examination. The results reported by him from testing oxides, together with the Tutweiler test made by the plant superintendent or other person, and an adequate record of purifier changes and batch performance, all taken together, would suffice to put purifying operation on a much higher plane than it now is in the average plant. It is believed that within a reasonable time it would also effect a real economy in dollars and cents. Purification costs heretofore have usually been but a small item in the total cost of making and distributing gas, but with the greatly increased cost of labour, it is becoming especially desirable to get the greatest absorption of sulphur with the least amount of handling. Revivification in place, with its obvious advantages where properly conducted, should become much more general. If difficulties are encountered, careful inquiries should be made as to why they are encountered. Only by intelligent study, aided by tests and good records, can the best results be obtained.

(*To be continued.*)

Explosive Gas Mixtures at Low Pressures.

The "Chemical Trade Journal" gives a translation of an article by Prof. Dr. A. Stavenhagen, in the "Zeitschrift für Angewandte Chemie," describing the results of his studies on the behaviour of explosive gas mixtures at low temperatures. He summarizes his conclusions as follows: (1) Explosive gas mixtures become uninflammable when their pressure sinks below a certain value—*i.e.*, explosive gas mixtures have a critical ignition pressure. (2) The intensity of explosion diminishes with falling pressure—*i.e.*, the speed of propagation of the explosive flame is retarded by reducing the pressure. (3) At pressures below the critical ignition pressures, slow flameless combination takes place, the quantity of the gas entering into such combination increasing as the pressure rises towards the critical pressure. (4) The critical ignition temperature is related to the nature of the gas, the proportion of the constituents in the mixture, the moisture present, and the initial impulse given.

At a recent meeting of the Sheffield Corporation Development Committee, it was reported that the Committee had had an interview with representatives of the Sheffield Gas Consumers' Association and the Sheffield Gas Company. The representatives of the Company included Sir Dugald Clerk and Mr. W. Doig Gibb, who explained in detail their reasons for believing that a calorific value of 480 B.Th.U. (which is the standard the Company propose to declare when the Board of Trade have issued the Order applied for under the Gas Regulation Act) will satisfy the requirements of Sheffield consumers. The General Manager of the Company (Mr. Halkett) explained that they were not going to alter or make any difference in the manufacture of the gas; but, in response to suggestions that the standard should be increased to 490 or 500 B.Th.U., they intimated that they could not promise anything further than 480 B.Th.U.

LOW-TEMPERATURE CARBONIZATION AND SMOKELESS FUEL.

Prof. Armstrong at the Society of Arts.

At the Royal Society of Arts on Wednesday last, Prof. H. E. Armstrong read a paper on "Low Temperature Carbonization and Smokeless Fuel." Sir Arthur Duckham, K.C.B., presided.

Prof. Armstrong, after a reference to the great value of coal, appealed against the unreasoned use of it as fuel, and the consequent waste resulting from it. Thought of coal could only make one white hot with wrath in these days, he said. Clearly, coal was at the root of all our difficulties. We were suffering severely from a "Coalitis," brought on by the unreasoned use of it as fuel and gross neglect of the things of the spirit. We were trying to do to-day with coal what was done successfully a century ago. We should worship it as our greatest possession. We might become excited over matters of no public consequence; but why not over matters that count? It was clear that we had far too long neglected to develop and apply a sound doctrine of relativity to our sublunary affairs. Our children were not taught to rejoice in their heritage of coal. The future of civilization depended upon the right use of coal, and all must learn to treat it with respect.

Dealing with smoke prevention, Prof. Armstrong said that not another minute should be wasted in further inquiry into the smoke nuisance—that would be futile. Legislation would not affect it until we had a means of preventing it; and the only possible solution was the use of smokeless fuels, either gaseous or solid. Each had its special advantages and disadvantages; but they were natural partners, and could be mutually helpful.

Coming to the gas industry, the author referred to its foundation, due to the experiments of Murdoch in 1792; its subsequent development; and the formation of the Gas Light and Coke Company. This Company, however, had never more than half justified its name, he added; and the splendour of its flame steadily diminished with years. The most interesting particulars of the gas industry were published by Frederick Accum in 1819, from which it was apparent that gas was gas in those days. As to coke, so far from the coal being reduced to a useless mass, coke was a residual which had proved better than coal in its natural state. It was stated by Accum that the demand for coke in London after the establishment of the Company's works had prodigiously increased, and many used coke to the total exclusion of coal. Why, said Prof. Armstrong, did people turn to this new material a hundred years ago? It was because it was a clean, honest fuel, and not a dirty one; and they would do so again for the same reason if the chance were given them. No one would object to its use being made compulsory, owing to the smoke nuisance. Relativity had not troubled the gas engineer, who had concentrated his attention upon producing and piping gas. As the demand for gas grew, it was necessary to raise the carbonizing temperature in order to increase the volume produced. The reaction set in fifty or sixty years ago; and from that time gas began to get poorer. Burners were improved, and gas was reduced in illuminating efficiency and heating power; and now gas companies were distributing great quantities of atmospheric nitrogen in their mains. He appealed that more inquiry should be made into methods of avoiding the great waste which was brought about by the use of raw coal, so that its full value might be got out of it.

In regard to smokeless fuels, Prof. Armstrong dealt with the history of the solid fuel enterprise, and the two men chiefly concerned with its invention—namely, Mr. F. W. Salisbury Jones and the late Mr. T. Parker, who had seen the possibilities of low-temperature carbonization. The late Prof. Vivian B. Lewes had also carried out a great deal of work in this connection. The product with which the lecturer had been interested was that known as "coalite;" and he discussed at some length the manufacture of this fuel, and the early experiments made in its development. In 1906, "coalite" was registered as a smokeless fuel by the Company then concerned in its production; and the results were so satisfactory that it was decided to form a larger Company. The shock to the gas companies was such that in 1907 the Gas Light and Coke Company advertised smokeless fuel in sacks, which was made in ordinary gas-retorts. The action of the gas industry seriously crippled the enterprise—the public view being that if the new fuel could be made by the gas companies at any moment, why should a new company be formed for its production. Although the enterprise failed to meet with very much support here, the Germans were alive to the value of the scheme. Early in 1913, a large German concern said they would join with the Coalite Company; but the war intervened in 1914, and so put an end to the German activities here.

Various plant had been set up in several places by the Company; but the only works now in operation were at Barnsley. In 1916, he visited the works, which were then in course of erection. He was also present when carbonization was first begun there, and on later occasions; and it was soon obvious that the staff had no previous experience of the process, and the experience gained by Mr. Parker—who had retired in 1914, very disheartened—was being thrown to the winds. Serious errors of construction had also been made with the plant. There were no scrubbers provided for removing dust and dirt from the coal; the regulation of the heat was difficult; and the machinery for discharging the ovens was unsatisfactory. The great mistake made

at Barnsley was that the complete works were erected before the efficiency of the primary unit had been established, and even before the problem and the requirements to be met were fully understood. The first set of nine ovens was soon rendered useless; but another set was soon erected, and met with partial success. In May, 1919, however, the Company secured the services of Mr. T. M. Davidson, an experienced engineer, who soon grasped the essential features of the problem and met the difficulties in a peculiarly happy way. The plant built to his design had been in operation since November, 1920, and was undoubtedly a practical success; carbonization taking five to eight hours, according to the thickness of the slab of coalite produced.

A few slides were shown illustrating the ovens and the withdrawal of the charge. The first showed the ovens and burners, with levers actuating a door at the bottom of the ovens, which carried the charge across the oven bottom, and, when withdrawn, let the charge down into the cooling chamber below. Other slides showed the cooling chambers, from which the charge was raked out and then pushed aside. The greatest advance which had been made consisted of getting over the expansion in the oven, which had been a great difficulty in the past in connection with discharging. By bringing down the charge to a practically air-tight chamber, it could be cooled to such an extent that it could be handled with the hands. There was exhibited a slab of coalite such as Prof. Armstrong had seen discharged on several occasions from the plant, in order to illustrate its structure.

Dealing with the oil obtained from the process, the author said it was too soon yet to speak of its uses in definite terms. It was quite different from gas-works tar (as would be seen from a specimen of it) as it could be poured almost like water. In his opinion, it should not be spoken of as tar—he thought it would be much better to call it coal oil. It had been subjected to the Admiralty test, and had been found to be well within the specification for oil fuel. Probably in the not far distant future a considerable saving of oil fuels would be effected by the use of specially-prepared solid fuels in their place.

Our immediate concern must now be to frame a comprehensive doctrine of relativity to govern our use of fuel, and interests should be consolidated if we were to be efficient. He believed there was a need for gas, electricity, liquid fuel, and solid smokeless fuel. Our primary unit being coal, we must first take from it the volatile constituents, gas and oil, and then use the residue as solid fuel. Coal when burning had a glowing surface which could not be exhibited by a gas-fire. Gas was fast reaching a price which must be prohibitive; and the relative cost of gas and solid fuel must also be considered. We must also have oil for internal combustion engines. There would come a time when America would have none to spare, and we ourselves could only get it in any quantity from our coal and oil shales. Coal was our national asset, and if we did not use it wisely, we should lose our place in the world.

DISCUSSION.

The Chairman said he had seen the plant at Barnsley; and it could be taken from him that it was near enough a commercially working plant. There were one or two small items which required bettering; but he was sure Mr. Davidson would soon get over these troubles. The great drawback to the process, to his mind, was that he had never seen an absolutely satisfactory balance-sheet from the treatment; and he thought it was the absence of this which had been responsible for keeping out the men with technical knowledge—*i.e.*, gas engineers. He was certain that gas engineers and those connected with the industry were not such fools that, if they could see something financially sound and could convert their undertakings, they would not take it on. The success of the process all hung on two things—namely, the value of the coalite and the value of the oil. He had tried to find values for low-temperature coal oils; but he could not get a sound value given, although he had been told that high prices could be obtained for the fuel. The oil should be of good value, and he had hopes of proving that this was so. He was not quite in agreement with the lecturer on one point, in that he had no great liking for solid fuel. He thought the future of this country was with heat units distributed as gas or oil, and power units distributed as electricity.

Dr. J. A. Harker said it was unfortunate Prof. Armstrong had not given a more definite answer to the economic aspect of the question. In connection with the work done with the fixation of nitrogen during the war by the Ministry of Munitions, a Sub-Committee was appointed to investigate the process of low-temperature carbonization. This Sub-Committee visited Barnsley and inspected the plant; and during the investigations it was ascertained that, on pre-war prices, from a ton of coal, of the value of £1, about 14 cwt. of crude coalite could be obtained, of which rather less than 13 cwt. was saleable—the remainder being put back into the process. Economically, the process entirely depended upon the possibility of selling the 13 cwt. of coalite for the same price as that for which the coal was obtained, and of paying for the running of the plant by the sale of the bye-products. It seemed to him that the whole thing rested on a very narrow margin; and he would like to know whether, at present prices, this could still be done. He congratulated the Company on the progress made so far; but the economic aspect of the process was not yet proved.

Mr. A. Seabrook said that he had looked into the possibilities of extracting something from coal before putting it under boilers; but the capital cost and the increased labour necessary to handle the plant did not equal the value of the product obtained. He had found that low-temperature coal was excellent so far as smokeless qualities were concerned; but it burnt very rapidly compared with coke or bituminous coal, and he could not see that the producers of this semi-coke were going to get a high price per ton.

Mr. W. H. Patchell said he had been struck by the sample of coalite exhibited by the lecturer; and he wondered what system of selection he had employed to pick it out, because the slides they had seen had shown practically all breeze. He had hoped to hear something of the Smith process,* which was operating in America. It seemed one of the most promising systems yet evolved. There were two stages—one in which the coke was made, the second consisting of briquetting it. Low-temperature fuels were very friable, and some form of briquetting would have to be taken up. A low-temperature coke must be made very adherent—to be the better transported.

Mr. G. M. Gill said it seemed to him that the great problem of low-temperature carbonization was to make coke which would stand handling; and he did not see how, while leaving a good proportion of volatile matter still in the coke and only heating it to a comparatively low temperature, this could be done. It seemed a practical impossibility at present, unless something which he did not know of was introduced into the process. In the gas industry the coke was hardening all the time in each process, and it was made strong enough to stand rough treatment. Even then they got something like 10 p.ct. of coke dust; and he thought this must be a great difficulty in front of those connected with low-temperature carbonization. He did not agree that the process adopted by the gas industry was inefficient. Out of a ton of coal they got about 17 cwt. of useful products, of which about 3 cwt. were used for heating the coal. Coke formed the larger portion of the bye-products; and he did not think gas coke should be despised. It contained carbon, and was most suitable for burning in hand-fired boilers, of which there were many thousands in this country; and in burning coke, which practically consisted of carbon, it was easy to regulate the air. They could get it right for burning, and then leave it, and they would obtain very good combustion. With coal it varied from minute to minute. Gas engineers were not at all dissatisfied with their present process; but they were waiting to be convinced as to the economic aspect of the low-temperature system.

Mr. D. Henshaw asked as to the ash content of the semi-coke or coalite Prof. Armstrong had shown, because it depended a great deal upon the ash content as to whether the coal could be successfully coked and kept in a condition suitable for transport, and then burnt in domestic grates for instance. If it was a coal with a high ash content, it still had disabilities which were inherent in gas coke, no matter the percentage of volatile matter remaining.

Dr. F. Mollwo Perkin expressed his regret that the author had confined himself to one process in his paper, because there were many others. There was the Smith process, for example; and he was not at all sure that a dual process of this character was not the best to employ. It was rather difficult at times to make gas people understand that the products obtained at low temperatures were not the same as those obtained at high temperatures. The Press never realized the danger of saying that benzole was obtainable in the same way from low-temperature carbonization as it was from high-temperature processes employed in gas-works; but this was not the case. Generally speaking, coke from low-temperature carbonization processes was softer than that from gas-works; but he had recently examined coke obtained from a low-temperature process, using Kent coal, which was just as hard as ordinary coke obtained from horizontal or vertical retorts. The trouble was that gas people, in endeavouring to make the largest quantity of gas from the coal, burned up a good quantity of the carbon and, consequently, obtained a coke which was high in ash. As to the ash content, it depended entirely on the ash content of the coal before carbonization, in the case of low-temperature carbonization.

The Chairman said there were two things to be done in connection with low-temperature working—one was the question of briquetting, which was one of the largest questions to be considered in the handling of fuel, and the second was the necessity for removing ash from the coal. A great deal of work was being done in this latter connection; but much more ought to be done on these two lines than had been done hitherto.

Prof. Armstrong, replying to the discussion, said the cost of the process was not his business as a professor. He had made a perfectly definite statement in order that it should be clear where the coalite process now stood. Although it was originally started in 1905, it really only dated back 1½ years—*i.e.*, the time when Mr. Davidson took the process in hand. Although great improvements had been made during this short period, there were still minute adjustments needed to bring the process to a point where it would be entirely practicable. The fight in the future would be between gas and this material. Either we would use this material and gas or this material—*i.e.*, coalite—only. To supply gas in a large city like London to the complete exclusion of coal would involve an expenditure on mains and plant which the gas industry would not be able to meet for a long time to come; hence the need for a smokeless fuel. The public should be prepared to pay more for coalite than coal, because it was better, in that it did not burn away so rapidly and was smokeless. As to oil, the minimum value of the oil was the value of a similar fuel at the moment. About one ton was obtained from 10 tons of coal, and therefore it was possible to get at a minimum revenue from this source. The sample he had on view was made from washed coal, and probably did not contain more than 5 or 6 p.ct. of ash. No coal should be used if not washed down to this point. It seemed to him that the gas industry was again n a critical condition; and it should make up its mind whether it would go into partnership with other interests.

LONDON AND SOUTHERN DISTRICT JUNIOR GAS ASSOCIATION.

Visit to the Beckton Gas-Works.

The members of the above Association to the number of 80, as briefly intimated in the "Journal" last week (p. 79), paid a visit to the chief works of the Gas Light and Coke Company at Beckton, on Saturday, April 9.

* See "Journal," Vol. CXLVII., p. 504.

Some Engineering and Reconstruction Work.

The party were met at the entrance by Mr. W. B. Leech, the Station Engineer, who gave the members of the Association a very hearty welcome on behalf of the Governor and the Directors of the Company. Had the visit been timed for a little later, he would have had some of his schemes completed; but he trusted that what they would see would, from a constructional point of view, though incomplete, yet prove of interest to them.

With Mr. Leech were Mr. J. S. Thorman (Deputy Station Engineer), Mr. W. Grogono, Mr. C. Chaplin (Assistant Engineers), and Mr. E. Edwards (Chief Chemist) to assist him in accompanying the members on their inspection. The party then boarded the train in waiting, and set out on their tour of the works. On the route, among many new items of interest was the "Ruston" shovel for handling store coal, fitted with caterpillar traction obviating the necessity of railway lines. Close by was a large condensing plant in course of erection, for taking water direct from the river for boiler use and works purposes. A halt was made at No. 2 pier, used to unload coal from colliers. The pier has twelve hydraulic cranes fitted with grabs, with a maximum unloading capacity of 700 tons of coal per hour. The coal is taken from this pier by trains, built-up of specially constructed bottom-tipping wagons, running on an elevated railroad. This coal can be shot straight into the coal-stores in the retort-house, or can be dropped under the viaduct in the yard.

Most interesting was the statement of Mr. Leech's at No. 1, or export pier for coke, pitch, and bye-products. From this pier the members were given to understand was to be installed the new method of coal conveying, about to be adopted at Beckton, by which the coal, instead of being conveyed from the river to the retort-houses by trucks, would be removed from the vessels by grabs with a capacity of 4 to 5 tons each, instead of 25 cwt., as at present, and would be belt conveyed under the pier direct to the retort-houses, where it was intended to deal with it by "Bradford" coal-breakers (an American device), and then again belt conveyed directly into the houses by shuttle conveyors to fill up the continuous hoppers; while a storage capacity for 130,000 tons of broken coal would be provided. This will serve Nos. 1, 3, 5, 2, 4, and 6 houses.

The retort-houses, of which there are 14, extend in a double line at right angles to the river, and are fitted as follows: Nos. 1, 9, and 12, with Fiddes-Aldridge (electric) machines; Nos. 3 and 5, with De Brouwer (compressed air) machines; Nos. 2, 4, and 8, with West's (compressed air) machines; Nos. 10, 11, 13, and 14, with Arrol-Foulis (hydraulic) machines; while Nos. 6 and 7 are reconstructing. All the retort-houses, with the exception of Nos. 10, 13, and 14, have coke-handling plant installed. This plant consists of horizontal conveyors which feed an inclined conveyor, which in turn delivers the coke to screening plant and coke storage hoppers.

The coal gas manufacturing plant is capable of making about 55 million cubic feet per day.

The gas, on leaving the retort-houses, is drawn through horizontal atmospheric condensers by exhausters, which are placed in five separate exhauster houses, and from there it is forced through the wet and dry purification plant and meters into the holders.

In No. 1 house the members were especially fortunate in seeing on the benches the experimental single steel ascension pipes to the hydraulic main, with a separate shut-off to each retort, obviating the rows of ascension pipes so familiar. This house contains thirty sets of ten retorts, 24 in. by 18 in. by 20 ft. long, charged by Fiddes-Aldridge machines fitted with stop-plates.

No. 3 retort-house, with its thirty sets of ten retorts, 22 in. by 18 in. by 20 ft. long, charged by West's machines converted over, and connected to, the De Brouwer charging system. Here was seen a novelty in the form of a special coke shoot for automatically filling fires. The machine is of a very simple contrivance, and travels the length of the house. Its use obviates all poking of the hot coke into the furnace.

The party stayed longest in No. 7 retort-house. This house (now under reconstruction), when finished, will contain 27 beds of ten retorts, 24 in. by 18 in. by 23 ft. long, which will be charged by Drakes' machines. It is estimated that the maximum throughput will be 2 tons of coal per retort per 24 hours. The coke plant will consist of a coke transporter and quenching bench, from which coke will be transported to a concrete hopper by telpher. This house is entirely under reconstruction. It was pointed out by Mr. Leech and Mr. Thorman that the retorts were 3 ft. longer than ordinarily used—viz., 23 ft. instead of 20 ft. This, they said, would enable the Company, when working with a full charge, to put 1 ton of coal in each retort, and, with a 12-hour charge, to carbonize 2 tons per twenty-four hours per retort. This is an unusual length of retort, just as the coke-quenching bench and conveyor about to be introduced are unique.

From here the party were conducted to the new concrete purifiers. These consist of two sets of five boxes 40 ft. by 40 ft., with overhead oxide floor, having a capacity of 8,000,000 c.ft. per twenty-four hours. The purifying material will be raised by pneumatic elevating plant. The purifiers are being built entirely in reinforced concrete, of two floors; the spent oxide being conveyed pneumatically into the upper floor for revivifying, in a manner similar to that adopted by the G.P.O. with their underground pneumatic tubes for telegram carriers—viz., by air suction and propulsion—another novelty in gas-works procedure.

The oil-gas boiler-house contains eight Babcock boilers, hand-fired, each capable of evaporating 10,000 lbs. of water per hour. Four additional Babcock boilers are now being installed fitted with Babcock-Wilcox chain-grates. A telpher is arranged so as to take coke to the hoppers over the boilers, and also bring the ash out from the ash pit, thus eliminating hand labour. These four boilers will evaporate 14,000 lbs. of water per hour—a further evidence of up-to-date enterprise at Beckton.

Besides the coal-gas manufacturing plant, there is a carburetted water-gas plant erected by Messrs. Humphreys and Glasgow. This plant has been re-modelled since 1911, and now consists of seven sets, each fitted with twin generators and single carburettors and superheaters. All operations are controlled by hydraulic power. Two blue gas sets are being installed with waste-heat boilers in place of carburettors, and, when finished, will have a capacity of 27 million c.ft. per day. Thus, from the first to the last item inspected, were seen reconstructing additional works and plant, new and original labour-saving devices, and ideas fresh to the industry as a whole.

After-Tea Speeches.

After a long afternoon, the party adjourned to the large mess room, where tea had been provided and was waiting.

Mr. Leech presided at tea, after which

The President (Mr. Frank J. Pearce) proposed a very hearty vote of thanks to the Governor and Directors of the Gas Light and Coke Company for their kind invitation and hospitality, and to the Station Engineer (Mr. Leech) for his great kindness in personally meeting and accompanying the party over the works; also to Mr. Thorman (the Deputy Station Engineer) and others. It had been a most interesting visit. In spite of the size, nothing of interest had been left out—it was quite a succession of interesting features all the afternoon. He was particularly interested in the "Ruston" shovel for handling coal, with its caterpillar traveller; it was a marvellous machine. He referred to the West machines and their conversion to the De Brouwer principle of working; also to No. 7 retort-house, with retorts 3 ft. longer than usual, with special mention of the handling of hot coke. He would like to mention the name of Mr. E. Edwards (the Chief Chemist), who, among others, so kindly gave his services to the Association that afternoon.

Mr. W. J Liberty (London), seconding the vote of thanks, said they were especially honoured in having the personal services of Mr. W. B. Leech and Mr. Thorman to meet, guide, and point out to them the very many extremely interesting items, and to give them the benefit of their experience. They all thought they knew their Beckton, and looked upon it as a kind of classic, that had been written-up so that there was nothing more to say about it; and it only remained for those who wished to know anything of this huge station to turn-up the back numbers of the Technical Press and find it there. But they were all greatly surprised that afternoon. He had known Beckton for the last forty years; but, as with others present, it came upon him as a great surprise to witness the large amount of reconstruction—new work, expansion, additions, and improvements of all kinds that were in full operation and contemplated, a few only of which he would enumerate. The "Ruston" shovel, with its caterpillar traction, saving sleepers, rails, and tip wagons, with their wear and tear. The large condensing plant (concrete built) for boiler feed, thus answering the contemplated demand of the Metropolitan Water Board, with its 100 p.ct. additional charges (it was hoped, he understood, to forego at least 50 p.ct. of the Board's water supply on the works). More gigantic still was the contemplated installation for the haulage of coal, from the present "export" or "No. 1" pier, by belt conveyor plant. What this would mean in economy alone would be something tremendous, considering the make of coal gas was 55 million cubic feet per day, the miles of railway that might be scrapped, and that no less than 1300 wagons and 75 locomotives were constantly under repair, most of which could be put out of use. The self-feeding coke "bus," as it was known on the works, with its saving in manual labour of two-thirds over the old method, abolished all poking. True, this was only accomplished by underpinning and deepening the regenerative furnaces by 13 ft. and altering the slope at the mouths, so that the hot coke fell straight from the discharged retort into the furnace by gravitation. Even with these charges on alterations, he was given to understand that there would be a considerable economy in labour, for by the simple turning of a handle the "bus" travelled from bench to bench quite easily It was a product of the brains of Beckton. How unfamiliar, too, he remarked, was the single ascension steel pipe per bench, after the forest of round iron pipes one was so accustomed to. Then there was the new method of coke quenching and conveying, after the principle of coke-oven practice in the North, by which the coke was gently conveyed from the moment it left the retorts (in the new No. 7 house now under construction). Instead of being thrown down and quenched on the conveyors, it would be caught in specially designed scoops and lifted to the top of a ferro-concrete quenching bench, built at such an angle that the coke would spread itself out in fan shape for quenching, giving the least amount of handling and consequently the minimum of breeze—the result being a good marketable coke of large size (which buyers were at present in a position to demand), so quietly and gently would it be moved in its transit from the retort and by gravitation deposited on to the bench, from which it would be conveyed by telpher-skip to the concrete hoppers. He concluded by referring to the reinforced concrete purifiers, with special reference to the pneumatic elevators. He believed he was correct in saying that this was quite a new principle in pneumatics as far as gas-works plant was concerned, and would be watched with interest. He would like to associate with the vote of thanks the names of Mr. W. Grogono and Mr. C. Chaplin in addition to the names already mentioned.

The President having put the proposition, it was unanimously carried.

Mr. Leech, in reply, thanked the Association for their kind vote to the management and himself and his assistants. It had given him a great deal of pleasure to be present with the members that afternoon. He appreciated the kind words of the President, as well as those of Mr. Liberty.

Mr. Thorman said they appreciated all that had been said. They

had been able to show and explain to the members that afternoon some reconstruction work and several novelties. With respect to the "Ruston" shovel, for moving store coal without rails, they were expecting great things from it. It was a better method than trucks from the point of mobility; it did away with sets of rails and could operate 60 tons of coal per hour. With regard to the water condensing plant for boilers, steam condensers, and works use, as had been remarked, it was hoped by the time the 100 p.ct. additional water charges came into force to be able to reduce the amount of the Board's water by at least 50 p.ct. The water would be treated with lime and passed over sand filters. The work of converting the West stoking machine into a "De Brouwer," they were proud of. Before the conversion it was not found possible with the scoop to get a full charge into the retorts. They had now overcome that. In No. 3 house, they had been able to put in the economical coke-feeding "bus," through deepening the furnaces from shallow to about 13 ft.; so that the coke went in by gravitation. In No. 5 house, they had been so able to fix their feeding doors that there was no plugging needed. They had put great hopes on the No. 7 house (now building). The coke quenching bench he believed was only in operation in gas-works at Manchester and Brighton. He had seen the system in operation at the Brighton works. The export people wanted large coke and not much breeze. This would give them what they required. Handling broke the coke; and this method gave the minimum of handling. They had deepened the furnaces in this new house by 13 ft. also, to accommodate the new coke-feeding machine. The Company had a make of 130 millions per day; but during five days in December they had a consumption of 150 millions per day. It had been a great pleasure, not only to Mr. Leech but to all concerned, to have the Association there that afternoon. They were proud of the magnitude of Beckton; and they were pleased to make things clear. They appreciated the visit, and the keen interest that had been taken in everything.

MANCHESTER AND DISTRICT JUNIOR GAS ASSOCIATION.

VISIT TO THE BOLTON (GAS STREET) WORKS, AND THE ANNUAL GENERAL MEETING.

As mentioned in last week's "JOURNAL," the members of the Manchester and District Junior Gas Association paid a visit to the Bolton Corporation (Gas Street) Works the previous Saturday afternoon, to view the installation of Woodall-Duckham vertical retorts now in course of erection. The party were received by the Engineer and Manager, Mr. W. J. Smith, B.Sc., who on behalf of the Gas Committee extended a very hearty welcome to them. Prior to the members viewing the progress of the work, Mr. James Bridge, the President, gave a full description of the plant and explained in detail the drawings illustrating the installation.

The setting consists of twenty-four vertical retorts, each capable of carbonizing 7 tons of coal per day—a total of 168 tons of coal per day, with an output of 2 million c.ft. of gas of 520 B.Th.U. gross.

The coal will be brought to the east end of the retort-house in railway wagons and discharged, by means of a rotary tipper, into a receiving hopper at the ground level. The coal will be fed by a jigging screen into a 45-ton per hour four-roll coal breaker, and thence by a rotary filler into a 50-ton per hour gravity bucket conveyor, which will elevate and convey it to a special travelling discharging shoot fitted with screens so that round coal may be discharged into one side of the storage bunkers and small coal or slack into the other half. The storage bunkers have a longitudinal centre division plate and have a 48-hour capacity.

The coal will be fed into auxiliary hoppers of 2 hours' capacity and then through a specially designed mouthpiece casting into the retorts, which are 26 ft. 2 in. long, 5 ft. 1½ in. by 6 in. at the top, and 6 ft. 6 in. by 1 ft. 7 in. at the bottom. Each pair of retorts is provided with a seal-pot. The speed of travel of the coal through the retorts will be governed by the rate of coke extraction at the bottom.

Cast-iron hoppers with water-sealed doors are provided at the bottom of each retort, and have a capacity of three hours' make of coke. Coke for the furnaces will be run to the end of the retort-house, and discharged into a receiving hopper on to a jigger, through the rotary filler and into the gravity bucket conveyor and the overhead storage hoppers of 48 hours' capacity arranged above the producers.

The producers, six in all, are fitted with stop-grates, and are situated at each end of the setting—three producers heating the twelve retorts on one side of the chimney, and three producers heating the twelve retorts on the other side. The producer gas is distributed from one main cross flue into flues contained in the front longitudinal walls. The secondary air is under separate control for both sides of every retort—making three circuits from the front to the centre of the setting at the bottom and then rising in the centre in a vertical flue to the top of the setting, where it comes into contact with the producer gas, and combustion takes place down three flues on each side of the retort. One-third of the way down the combustion flues, arrangements have been made to admit an auxiliary supply of secondary air, to allow for further combustion at this point if found desirable when steaming the charge.

The waste gases leaving the combustion chambers are led to the front of each retort and rise-up into the main waste-gas flue. From this flue the gases are drawn by a fan through a waste-heat boiler of the cylindrical multi-tubular type, and then through a feed-water heater. The fan is driven by a 25-H.P. De Laval steam-turbine; the exhaust steam being used for steaming the furnaces. The waste-heat boiler will supply steam to five nozzles situated in each side of the retorts. The steam will be superheated by passing it round the bottom of the retorts before admitting it to the charge.

Each retort is so built as to be completely separate from the next—being provided with its own supply of producer gas and secondary air inlets, regenerator and waste-gas flue damper—and so may be worked independently of the adjoining retorts.

On the members assembling for the formal business of the meeting,

Mr. W. H. Battersby (Bury) proposed a vote of thanks to the Chairman and the Vice-Chairman of the Bolton Corporation Gas Committee and their Gas Engineer for the privilege of visiting the Gas Street Works, and also for their kind hospitality. He thought all would agree they had seen a very excellent installation of vertical retorts and one that would give a high efficiency. The Engineer, he understood, was installing a waste-heat boiler in conjunction with these retorts and also at the Lum Street works, so as to get the best out of his plant, and save all the fuel possible—so doing a duty, not only to Bolton but to the nation, as regarded conserving coal, which was such a national asset. Bolton ought to be proud of itself, as it had great commercial associations; and he thought they ought to be proud of their gas engineer and management.

Mr. S. Tagg (Preston), President of the Manchester Institution of Gas Engineers, seconded the resolution. He said that when the Vice-Chairman looked round, he would think that the name of Junior Gas Association was somewhat of a misnomer. He himself joined the Association some twenty years ago; and he thought that to-day the Juniors could rival the Senior Association in the interest taken. Further he was of opinion that the name might well be changed, and be (say) the Manchester and District Society of Gas Technicians. The value of the Association was shown by the great interest taken at that day's record visit.

Councillor J. Taylor, in reply, said he was sorry the Chairman could not be there that afternoon, but speaking on behalf of the Corporation, he said he was proud of the town, and thanked them for their kind expressions. They were pleased to do their duty as hosts; and he felt that in gas production and distribution these visits were of national value. If one town had any advantage, it should let others see it and take it back to their undertakings for use there. Bolton was not at all behind, and was for every progressive movement. Some would that day have seen what they had not seen before. He was pleased to hear such a good opinion of their Engineer and Manager and staff. He thought Bolton put gas into the holder at as low a cost as any in the country, with only one or two special exceptions. In conclusion, he took the opportunity of welcoming them all. He would have liked to have done so at the works, had he been able to be present. He spoke in high terms of the President, Mr. Bridge, and thought they had made a good choice. The Council were also proud of their Gas Engineer.

Mr. W. J. Smith, in reply, considered it would be very remiss on his part if he did not express personal thanks for what had been said by the Vice-Chairman, the mover, and the seconder. The President had filled the position with credit to the Association and to himself. He was pleased to hear the high terms in which he was spoken of by the Association; and he (Mr. Smith) could personally endorse all that had been said about Mr. Bridge. He thought that at some future time Bolton would be able to provide them with another President.

Mr. J. Berry (Oldham) then made an offer of a prize of two guineas for the best paper given during the coming session.

Thereafter was held the

ANNUAL GENERAL MEETING.

REPORT AND ACCOUNTS.

The Hon. Secretary (Mr. J. Alsop) presented the report for 1920. During the year 18 members had joined the Association, 14 had for various reasons ceased to be members, and one member had died. The membership was 181—an increase of 3 over 1919. Four papers had been read and four visits made during the year. The Joint Council had dealt with the education scheme, and with the qualifications for membership of the Institution and the Junior Associations. The prize for the best paper read, offered by Mr. R. H. Garlick, had been awarded to Mr. W. H. Battersby.

An interim statement of accounts was presented by Mr. J. Robinson (Altrincham), the Hon. Treasurer.

ELECTION OF OFFICERS.

The following appointments were made:

President: Mr. J. B. Stewart.
Vice-President: Mr. G. Dixon.
Hon. Secretary: Mr. J. Alsop.
Hon Treasurer: Mr. J. Robinson.
Auditor: Mr. F. A. Collier.
Members of Council: Messrs. H. C. Applebee, S. Carter, W. H. Battersby, J. H. Clegg, H. J. Hailstone, I. H. Massey.

THE COUNCIL THANKED.

Mr. J. T. HAYNES (Lancaster) moved a vote of thanks to the Council in appreciation of their work. He congratulated them on their life and energy. He thought that the policy of visiting small works was a good idea, as there one could see things in greater detail that were not quite as clear on large works. The record attendances they had experienced during the session were signs of their appreciation; and the number present at the Council was an indication of the interest taken by the members comprising the Council. The visits to the works had revealed marked professional abilities. He maintained

that membership of the Association was an honour, and that election to the Council was the hall-mark of professional ability.

Mr. J. ALBINSON, B.Sc. (Manchester), seconded the resolution.

Mr. FLETCHER (Liverpool) replied on behalf of the Council. He said they appreciated the remarks made in reference to the services of their chosen representatives. They had been passing through rather strenuous times; and he thought it was a credit to the Council that they had been able to carry on so very ably. The visits and papers read had been most instructive and profitable, as shown by the full attendances. The education scheme and the formation of the National Association of Technical Gas Officials (the former being the most important) had made a big call on their President and the Council. Mr. Heald had done very useful work on behalf of the National Association of Technical Gas Officials as the Local Secretary. He thought the choice of the Council in past years had been very happy, and that the members had always worked most harmoniously together.

THE PRIZE PRESENTED.

Mr. R. H. GARLICK, at the call of the President, presented to Mr. W. H. Battersby the prize he had offered at the last annual meeting for the best paper read during the session. The recipient had made his own choice of useful technical books.

Mr. BATTERSBY replied in suitable terms.

INTRODUCTION OF THE NEW PRESIDENT.

Mr. BRIDGE, the Retiring President, in introducing his successor, Mr. J. B. Stewart of Rochdale, said he thought the new President would be second to none. It was a number of years since they had a President who was solely engaged in the distribution of gas; and he hoped that during the coming session distribution subjects would be in the forefront. He hoped Mr. Stewart would be as happy in his new duties as he had been.

Mr. STEWART, on taking the chair, thanked Mr. Bridge for his expressions of commendation, and the members for their reception and confidence. He mentioned previous occupants of the presidential chair, and hoped he would be able to keep up the high standard which had been reached. He should do his utmost to repay them for their confidence by an earnest endeavour to emulate his predecessors. The Past President had given long years of service, and had always been noticed for his courtesy and anxiety to help all members. The past session had been a unique one. They had visited Leigh, Stretford, and Bolton—all works where their Past President had been engaged, which spoke volumes in itself.

Mr. BRIDGE, in reply, said he had done all he possibly could to further the interests, and raise the status, of the Association. He desired to thank the Council for the support given him by the Association generally.

Mr. HEALD and Mr. DIXON then reported on the National Association of Technical Gas Officials—its formation, the work done, and that proposed to be done in the near future.

A New Make of Gas-Engine.

Professor F. Bacon, M.I.Mech.E., contributes to the "Western Mail" (Cardiff) a monthly column of engineering notes; and in his last article he deals with an engine made by Messrs. Vickers. He says: One of the latest English firms to embark on the manufacture of large horizontal gas-engines of Continental type is Messrs. Vickers. Eight such engines are now being constructed at their Barrow works for use in steelworks, where they will be run on cleaned blast-furnace gas having a calorific value of 100 B.Th.U. per cubic foot. Some of them are to be direct-coupled to electric generators; and others will drive reciprocating blowers. They are of the tandem double-acting four-cycle type, with cylinders 43'3 in. diameter and 47'3 in. stroke, developing a normal load of 1750 B.H.P at 100 R.P.M. The engines being of the four-cycle double-acting type, each end of each cylinder is fired in turn; so that there is an impulse every stroke. Low-tension ignition is used; and two make-and-break plugs operated by solenoids are fitted at each end of both cylinders. The solenoids are excited by a separate dynamo, which connects to a distributor fitted on the valve-shaft, which runs at half the speed of the engine. The cylinder jackets, covers, and exhaust valves are water-cooled; and a separate supply of cooling water is transmitted to the piston rods and pistons through swinging pipes connected to intermediate coupling. The engine is started by compressed air from a reservoir, maintained at a pressure up to 300 lbs. per square inch. Forced lubrication is fitted for the cylinders, stuffing-boxes, and exhaust-valve spindles, and a gravity oil supply to the crosshead slide, main bearings, and connecting rod. A governor connects to light ball-bearing throttle-valves on the gas and air supply; and, in addition, the requisite proportion of gas and air to be admitted to each cylinder end can be controlled by hand-operated valves. An engine of 3500 B.H.P., at 100 R.P.M., is got by combining twin tandem units, to operate on a single crank-shaft, with fly-wheel and generator between.

Committee on Limitation of Inerts.—On Monday, the Committee appointed by the Board of Trade to inquire into the subject of the limitation of incombustibles supplied in gas met again after the Easter vacation. Mr. J. Hunter Gray, K.C., presided; and Mr. W. J. A. Butterfield and Dr. Lander were also present. Evidence [a report of which will appear in the next issue of the "JOURNAL"] was given by Mr. A. E. Broadberry, M.Inst.C.E., the Engineer and Manager of the Tottenham District Light, Heat, and Power Company, and Mr. T. F. E. Rhead, M.Sc., the Chief Chemist to the Birmingham Corporation Gas Department. Both sat together at the witness-table, though they made separate statements to the Committee.

FELD'S DIRECT AMMONIUM SULPHATE PROCESS.

[From the "Chemical Trade Journal."]

In 1912 Walther Feld published a process claiming to have solved an old outstanding problem of gas and coke technologists. He converted the sulphuretted hydrogen in the gas directly into sulphuric acid, which then combined with the ammonia of the gas, giving ammonium sulphate.

Feld suggested leading the ammonia and sulphuretted hydrogen gases through aqueous solutions of ammonium trithionate and tetrathionate, whereby these polythionates are converted into ammonium thiosulphate. This latter compound on treatment with sulphur dioxide is reconverted into the polythionates; but double the amount of these compounds is obtained as was originally employed. If, now, the amount of ammonium polythionate in excess is removed from the cycle of operations and its solution boiled, it decomposes into ammonium sulphate, sulphur dioxide, and sulphur. The sulphur dioxide is re-utilized in the operation, as is also the sulphur.

The following equations illustrate the process. For purposes of simplicity a mixture of two molecules of ammonia and one molecule of sulphuretted hydrogen is considered as ammonium sulphide:

(1a) $(NH_4)_2S_3O_6 + (NH_4)_2S = 2(NH_4)_2S_2O_3$.
Ammonium Trithionate. Ammonium Thiosulphate.

(1b) $(NH_4)_2S_4O_6 + (NH_4)_2S = 2(NH_4)_2S_2O_3 + S$.
Ammonium Tetrathionate. Ammonium Thiosulphate.

(2) $4(NH_4)_2S_2O_8 + 6SO_2 = 2(NH_4)_2S_3O_6 + 2(NH_4)_2S_4O_6$

(3a) $(NH_4)_2S_3O_6 = (NH_4)_2SO_4 + SO_2 + S$.

(3b) $(NH_4)_2S_4O_6 = (NH_4)_2SO_4 + SO_2 + 2S$.

(4) $4S + 4O_2 = 4SO_2$.

The sum result of all these reactions is:

$$2(NH_4)_2S + 4O_2 = 2(NH_4)_2SO_4.$$

That is, the ammonium sulphide is oxydized to ammonium sulphate by means of the oxygen of the air.

Feld never exploited his process on the large scale; for he died in 1914. He had, indeed, proved at the Königsberg Gas-Works that ammonium sulphate could be obtained by his method; but the plant was not large enough to permit of accurate deductions as to efficiency and economy being drawn.

Dr. F. Raschig ("Zeitschrift für Angewandte Chemie") has investigated the reactions involved in this process, and has come to the conclusion that if the directions of Walther Feld as to the concentration, &c., are carefully followed out, the process proceeds smoothly, and the equations are correct representations of the reactions. Dr. Raschig is of the opinion that the commercial exploitation of the process is a sound proposition. Several new reactions of the rather vaguely known polythionates are involved in the process. One is that when tetrathionates, pentathionates, or, in fact, all polythionates higher than the trithionate, are treated with a sulphite in aqueous solution, the polythionates are instantaneously converted to trithionates with the simultaneous production of a thiosulphate:

$Na_2S_5O_6 + 2Na_2SO_3 = Na_2S_3O_6 + 2Na_2S_2O_3$.
Pentathionate.

$Na_2S_4O_6 + Na_2SO_3 = Na_2S_3O_6 + Na_2S_2O_3$.
Tetrathionate.

This reaction is so speedy and definite that it is suggested as a means for the volumetric determination of polythionates.

Arresting Dust in a Producer Plant.

The whole battery of 21 benches of vertical retorts installed at the works of the Rochester (N.Y.) Gas and Electric Corporation is heated by producer gas from a central plant. The coke leaving the retorts is passed over a 1¼-in. screen; and it is the screenings through this which are used as the producer fuel—requiring a high blast pressure, which causes some dust to be carried along with the producer gas. The first point at which this dust is removed is at an individual dust trap, one of which is installed on each producer. Three producers are in service at all times; and the individual traps (which are blown down once each day) are found to remove about 50 p.ct. of the total dust in the system. These arresters are simply T's. The gas is taken off at the top; and a downward-turned extension catches the dust, which is removed by means of a cone-valve. The principal dust arrester, however, is of the cyclone type, and is installed in connection with the main gas-flue. It is in the form of a large hollow cylindrical shell. The gas enters this shell on the side tangent to the side wall of the shell, and at an angle of 45° downwards. The outlet of the arrester is at the top of the shell. The gas, as it enters the shell, impinges against the circular side walls, which cause it to swirl; and as the velocity of the gas steadily decreases as it reaches the centre of the whirlpool, the dust drops into the catch-basin at the bottom of the shell. This arrester, which is blown-down once every day, removes about 48 p.ct. of the dust carried into the system. At the foot of the goose-neck carried over from the cyclone is another trap; but very little dust is removed at this point. This trap and eight others distributed about 20 ft. apart along the main gas-flue header remove the remaining 2 p.ct. of the dust.

REGISTER OF PATENTS.

Recovering Ammonia from Coke-Oven and Other Gases.—No. 127,549.

Société Industrielle de Produits Chimiques, of Paris.

No. 15,756; Sept. 27, 1918. Convention date, May 27, 1918.

This invention relates to the recovering of ammonia from coke-oven and like gases and for forming ammonium sulphate.

Various processes are, say the patentees, known for the recovery of ammonia by the absorption of ammonia gas in a solution of nitre cake. The specification No. 114,236 described a process in which ammonia is absorbed in sodium sulphate, whereupon the solution is adjusted so that it corresponds to the molecular formula:

$$1000\ H_2O{:}36Na_2SO_4{:}36(NH_4)_2SO_4.$$

This solution is refrigerated to − 10° to − 15° C., to cause a precipitation of Glauber's salt, and then evaporated to obtain a portion of the ammonium sulphate.

It has also been proposed [No. 19,530, 1893] to obtain half or even more of the sodium sulphate in the form of Glauber's salt by cooling a solution of sodium sulphate and ammonium sulphate, diluted to a specific gravity of 55° to 60° Tw. at 90° Fahr. or to corresponding specific gravity at other temperatures such as may result from chemical action—allowance being made for steam going off at higher temperatures. But in spite of the number of given directions, no exact indication is given which allows the solution to be cooled to be prepared, if regard be had to the fact that a solution of the specific gravity of 1·300 deposits on cooling the double salt $Na_2SO_4 + (NH_4)_2 + 4H_2O$, and not Glauber's salt.

In specification No. 109,814 a process was described for the manufacture of sodium carbonate and ammonium sulphate from bisulphate of soda. Here a mother liquor containing the double salt in solution was obtained, and it was pointed out that sodium sulphate could easily be obtained from the double salt $Na_2SO_4 + (NH_4)_2SO_4 + 4H_2O$ by dilution with water to such a degree that there are 15 grams of sodium sulphate to 100 grams of water, and cooling; while the ammonium sulphate could be obtained by concentration.

According to the present invention, ammonia is absorbed in a liquid containing sodium bisulphate in a manner to obtain a precipitate of a double salt of sodium sulphate and ammonium sulphate, or a salt of about the same composition. The mixture is then diluted with water to such a degree that there is present about 15 kgs. of sodium sulphate to 100 kgs. of water, and refrigerated preferably to about 0° C. to obtain crystalline $Na_2SO_4 + 10H_2O$. The mother liquor is then heated to evaporate water and to separate the ammonium sulphate, while the final mother liquor is returned into the working cycle.

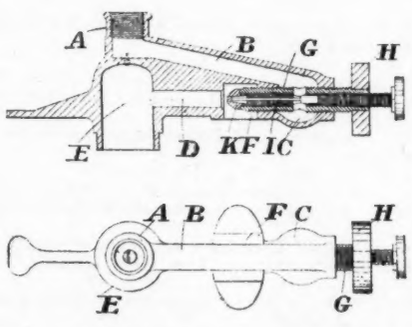
On refrigerating, about two-thirds of the sodium sulphate present—that is, nearly 10 kgs.—separate out as the salt $Na_2SO_4 + 10H_2O$, which is recovered in a filter press, centrifugal machine, or by other suitable means. All the ammonium sulphate, on the contrary, remains in solution, and is separated by concentrating the mother liquor by heating. The crystals obtained are separated in a centrifugal machine or other analogous means; and the mother liquors resulting from this latter operation are again treated as above described.

Incandescent Gas-Burners.—No. 158,810.

Colbran, J. B., of Manor Park, E.

No. 13,665; May 18, 1920.

This invention refers more particularly to burners wherein adjustments for air and gas are effected by a hollow plug through which gas is supplied to the bunsen tube, and the exit from which is controlled by a needle-valve operated by a screwed head and stem, and which, when rotated, serves to effect the control of the air admission to the bunsen tube.



Colbran's Incandescent Gas-Burners.

The burner body is formed with a screwed boss A for attachment to the gas supply, and has a passage B leading from the boss A to a chamber C which opens to a bunsen tube D, which, at its other end, is in communication with a recessed portion E of the burner body, which portion E is extended to project from the body and is screw-threaded for the reception of the mantle carrier. An opening F is made in the burner body to intersect the Bunsen tube D and serves for the admission of air thereto, and as the mixing chamber.

The supply of air is controlled by a hollow plug G which is screwed into the end of the regulator body, passes through the gas-chamber C, and enters the air aperture F of the Bunsen tube D. The plug G is fitted with a nipple K formed with a conical end which serves as a valve and (finding a seating in the open end of the bunsen tube) closes, partially closes, or opens the bunsen tube when and as it is revolved by turning the head H secured upon the end (squared for its reception) of the plug, and thus the air admission to the burner is controlled. In small indoor burners, the nipple takes its seating in the end of the burner which is fitted in the mouth of the mixing chamber of the bunsen tube.

The plug G, at a suitable portion of its length, is formed with slots so arranged as to be in the chamber C. Gas is admitted through these slots to the interior of the plug, whence its flows through a small orifice in the nipple to the mixing chamber F, and thence into the bunsen tube.

A needle valve I serves to control the orifice in the nipple at end of the hollow plug, operated by a head and stem threaded to screw into the hollow plug, which is internally threaded for its reception.

In operation, the gas entering the regulator passes through the conduit B into the chamber C, whence it flows through the slots G in the periphery of the hollow plug G, into the plug and out through the orifice in the nipple K into the mixing chamber F of the bunsen tube—the passage of the gas through the orifice of the nipple being controlled by the needle valve, which (by means of the screwed stem and head) is made to close the orifice to any required extent. Air entering the opening F in the burner body mixes with the gas as it enters the bunsen tube, and the entry of air to the tube is controlled by manipulating the hollow plug by turning the head H—the coned end of the nipple K of the hollow plug engaging the opening of the bunsen tube to any required extent.

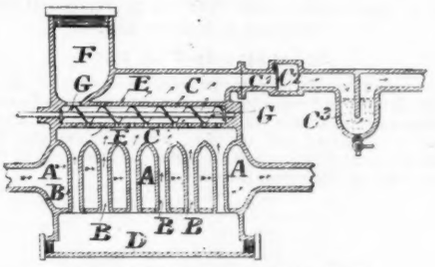
Gas Manufacture.—No. 160,202.

Hayes-Gratze, E. V., of Whitfield Street, W.

No. 24,804; July 10, 1920.

This invention relates to the dry distillation of coal.

It has already been proposed, the patentee remarks, to utilize exhaust gas for heating retorts and other carbonizing apparatus both externally and internally; and the present invention comprises essentially a plurality of tubes or chambers heated by the exhaust gases of internal combustion engines and through which the gas-producing material is continuously fed, means for leading away the evolved gas from the tubes or chambers, and means for collecting or removing the spent material. The gas so produced may be used as the fuel for an internal combustion engine, for enriching a poor fuel, or "for any purpose found desirable and useful."



Hayes-Gratze's Dry Distillation Plant.

The illustration shows diagrammatically a self-contained apparatus for producing gas from coal dust or similar finely-divided carbonaceous material.

The chamber A is formed in one with, or as an enlargement of, the exhaust pipe of an internal combustion engine, and through which pass a plurality of tubes B, preferably flared at their ends as shown. The upper ends open into a chamber C, and their lower ends into a closed receptacle D. Within the chamber C, and above the open-ended tubes is arranged a perforated cylinder E, one end of which is in communication with the interior of a closed hopper F adapted to contain the finely-divided gas producing material to be employed. Mounted to revolve within the cylinder is a worm conveyor G, to take the coal dust from the hopper along the cylinder and through perforations therein, so that it falls by gravity through the tubes B, and, after gasification, the residue falls into the receptacle D. The gas (the passage of which is indicated by tailless arrows) liberated from the falling material passes into the chamber C and is led therefrom through the conduit C^1, preferably through a non-return valve C^2 and through a cooling or scrubbing chamber C^3 to a reservoir or gas-holder.

The exhaust gases or/and flame from the engine (the passage of which is indicated by tailed arrows) impinge on the walls of the tubes B and so heat them, and the coal dust passing through, to a very high temperature. The heat and gas released from the dust rise up the tubes and hold the dust in a state of temporary suspension until it is completely gasified—the resulting coke or other residue falling into the receptacle D, from which it may be removed at intervals or automatically by means of a worm conveyor.

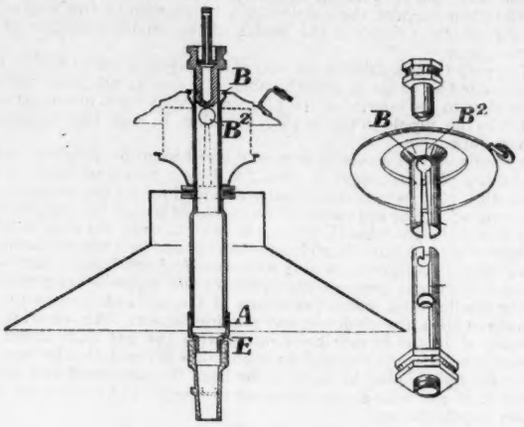
Incandescent Burners.—No. 159,964.

Osbaldiston, J., of Blackburn.

No. 30,578; Dec. 6, 1919.

This invention relates more particularly to incandescent gas-burners of the inverted type, such as are used for lighting mills and factories. It consists in making the upper edge of the outer tube, where the cover or canopy is affixed, of bevelled, flared, or bell-mouthed shape, so that the outer tube cannot grip the inner tube at this point, and in making the slit or slits in the outer tube of elongated inverted V shape which will give sufficient pressure between the two tubes to prevent the

rotation of the outer tube by vibration of the machinery. Further, it is proposed to employ with such a burner a pre-heating chamber at the bottom of the inner tube above the mantle.



Osbaldiston's Incandescent Burner.

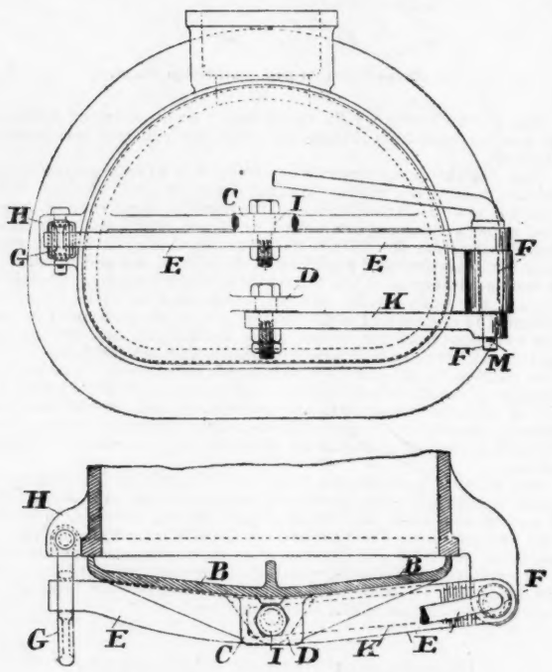
The burner is of usual construction with inner and outer tubes, the rotation of the latter serving to regulate the supply of air to the burner. The upper edge B of the outer tube, to which the canopy is attached, is not in contact with the inner tube. Slots are formed in the outer tube extending from the air apertures B^2 to the bottom of the tube so as to allow of sufficient expansion of the inner tube when the latter becomes hot. The end of the tube above the mantle carrier is screwed to receive a pre-heating chamber E, provided with an internal ledge or rim. When the chamber becomes hot, the down-flowing streams of air and gas impinge against this edge and become heated before passing to the combustion zone of the burner.

Retort Mouthpiece Fittings.—No. 160,376.

Wright, E. T., and Skidmore-Westwood, W. W. (Westwood and Wrights), of Brierley Hill.

No. 11,847; April 29, 1920.

This invention has for its principal objects to simplify the construction of the fittings and provide means whereby their adjustment from time to time to compensate for wear, distortion, or displacement from any cause is facilitated and rendered more efficient and the correct position of the door relative to the machined or faced end of the mouthpiece or framing of the retort is maintained.



Westwood and Wright's Retort Mouthpiece Door.

In the illustration, the self-sealing door has on its outer face upper and lower projecting lugs marked C D. The upper lug is arranged preferably at, or slightly above, the middle horizontal line of the door, and has laterally extending ribs or webs to strengthen the door at this part. The ribbed lug rests on, and is supported by, the main bar E, one end of which is pivoted on an eccentric hinge pin F working in the knuckle or lug G projecting from the body of the mouthpiece. The unpivoted end of the main bar E is engaged when the lid is in its closing position by the catch or fastening G pivoted to the lug H on the mouthpiece body.

The upper lug C and the main bar E, on which it rests, are connected by a bolt I having a cam or eccentric part occupying the hole in the lug. The position of the cam determines the pressure of the lid against the mouthpiece or frame, and which pressure may be re-adjusted by the partial rotation of the bolt from time to time.

K is a supplementary bar hinged at one end to the lower end of the eccentric hinge pin F—being held in position by the cotter-pin M. The connection of the unhinged end of the bar K with the lower lug D in any manner which will provide means for adjustment whereby the wear of the fittings may be compensated for, can be effected in various ways.

Incandescent Gas-Mantles.—No. 160,040.

South Metropolitan Gas Company, and Gair, C. J. D., of Vauxhall, S.E.

No. 1392; Jan. 15, 1920.

The standard thoria mantle consists, as the patentees point out, of a skeleton of substantially pure thoria containing 0·8 to 1 p.ct. of ceria—the proportion of the latter having been adopted as a result of numerous experiments made for ascertaining the maximum increase of illuminating value obtainable by adding ceria where no other mineral matter is present in the thoria. But the light emitted by a thoria mantle containing such a proportion of ceria is deficient in the blue rays of the solar spectrum, and a demand has arisen for a mantle yielding a spectrum more nearly approaching the solar spectrum in this respect.

By their present invention the proportion of ceria in a mantle consisting otherwise of substantially pure thoria is reduced to a proportion of 0·2 to 0·4 p.ct., whereby a whiter light than that yielded by the ordinary thoria mantle is obtained—a light that "approximates to daylight."

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for April 13.]

Nos. 9837 to 10,515.

Allday, H.—"Friction lighters." No. 10,097.
Barton & Sons, W.—"Method of making pipe joints or couplings." No. 10,113.
Baty, E. J.—"Process of gas purification." No. 9868.
Baty, E. J.—"Gas purification." No. 10,230.
Bentley, F. C.—"Burner for coal gas." No. 10,430.
Biddison, S.—"Combustible gas and generating and burning of same." No. 10,132.
Blakeborough, R. A.—"Cocks or taps." No. 10,105.
Buckett, W. J.—"Apparatus for controlling supply of gas." No. 10,180.
Carpenter, C.—"Means for protecting incandescent gas-mantles." No. 9936.
Chrisman, C. S.—"Heads of water-gas generator &c. chambers," No. 10,301.
Compagnie pour la Fabrication des Compteurs et Matériel d'Usines à Gaz.—"Oscillating-bells gas-meters." No. 9949.
Cox, K.—See Baty, E. J. No. 10,230.
Cutler-Hammer Manufacturing Company.—"Measuring calorific value of combustible gases." Nos. 10,302-3.
Daniel, C. C. A.—"Gas-turbine." No. 9901.
Ebbw Vale Steel, Iron, & Coal Company, Ltd.—"Neutralizing and drying sulphate of ammonia." No. 10,482.
Glover, W. R.—"Atmospheric gas-burner." No. 10,035.
Halliday, T. M.—See Barton & Sons. No. 10,113.
Hardie, G. D.—"Charging device for retorts, producers, &c." No. 10,337.
Hardie, G. D.—"Discharging outlet for coke or residues." No. 10,338.
Heeley, G.—See Compagnie pour la Fabrication des Compteurs et Matériel d'Usines à Gaz. No. 9949.
Helps, G —"Calorimeters." No. 10,323.
Humphreys & Glasgow, Ltd.—See Chrisman, C. S. No. 10,301.
Igranic Electric Company, Ltd.—See Cutler-Hammer Manufacturing Company. Nos. 10,302-3.
Ivers, D.—"Attachment of flexible diaphragm to dry gas-meters, &c." No. 10,454
Kerr, R. P.—See Baty, E. J. No. 10,230.
Lawson, F. H.—See Blakeborough, R. A. No. 10,105.
M'Indoe, R. W.—"Prepayment mechanism for gas-meters." No. 10,458.
Macintosh, A. A.—"Destructive distillation of coal." No. 10,400.
Maclaurin Carbonization, Ltd.—See Hardie, G. D. Nos. 10,337-8.
Moncrieff, W. D. Scott-.—"Apparatus for charging and discharging retorts." No. 10,227.
Moncrieff, W. D. Scott-.—"Retorts." No. 10,228.
Moncrieff, W. D. Scott-.—"Apparatus for quenching contents of retorts." No. 10,334.
Mücke, G.—"Machines for burning-off incandescent gas-mantles, &c." No. 10 154.
Page, J. H.—"Geysers." No. 10,013.
Scott, R. F.—See Barton and Sons. No. 10,113.
Smith, J. H.—See Glover, W. R. No. 10,035.
Soc. l'Air Liquide (Soc. Anon. pour l'Etude et l'Exploitation des Procédés G. Claude).—"Synthesis of ammonia." No. 10,189.
Stokes, A.—See Carpenter, C. No. 9936.
Taunton, R. P.—See M'Indoe, R. W. No. 10,458.
Thickins, D.—See Ebbw Vale Steel, Iron, and Coal Company, Ltd. No. 10,482.
Tourtel, J. M.—"Apparatus for cooking-stoves." No. 9867.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

Progress of Bills.

The Nelson Corporation Bill: Read the third time, passed, and sent to the Commons.

The Wandsworth, Wimbledon, and Epsom District Gas Bill: Reported from the Select Committee, with amendments.

A petition has been deposited by the Bridgend Gas and Water Company against the Mid-Glamorgan Water Board Bill.

The draft of a Special Order proposed to be made by the Board of Trade under section 10 of the Gas Regulation Act, 1920, on the application of the Swansea Gas Light Company has been approved and agreed to.

HOUSE OF COMMONS.

Progress of Bills.

The Waltham and Cheshunt Gas Bill: Read a second time and committed.

The Harrogate Gas Bill and the South Metropolitan Gas Bill: Reported, with amendments.

The Nelson Corporation Bill: Read the first time, and referred to the Examiners.

The Colne Corporation Bill: Reported, with amendments, from the Local Legislation Committee.

Requisitions to withdraw petitions have been made by the Winchester Water and Gas Company against the Southampton Corporation Water Bill; by the North Eastern Railway Company against the Harrogate Gas Bill; and by the Quorndon Urban District Council against the Leicester Corporation Bill.

Curtailment of Light and Power.

Viscount CURZON asked the Prime Minister whether, in spite of the regulations on the subject so far introduced, his attention had been drawn to the gross waste of light and power now taking place in shops, restaurants, places of entertainment, and private establishments; and whether, in the event of the industrial stoppage being prolonged or extended, he would issue such regulations, backed by an appeal to the community, which would ensure that the consumption could be reduced forthwith by at least two-thirds.

Mr. BRIDGEMAN, who replied, said attention had not been called to any general failure to comply with the provisions of the Coal Emergency Directions, 1921. The duty of seeing that the Directions were observed rested upon the local authorities, who would obtain advice from the police if necessary. The question whether any further restrictions upon the consumption of fuel were necessary or desirable in the circumstances was being carefully considered.

Sir H. BRITTAIN asked whose duty it was to bring the matter before the local authorities.

Mr. BRIDGEMAN said it was the duty of any member, if he knew of a case, to bring it before the local authority.

Public Utility Companies (Capital Issues) Act, 1920.

Reports were presented on applications to the Board of Trade under the Act by the Chester United Gas Company and the Westgate and Birchington Gas and Electricity Company.

Importation of German Gas-Mantles.

Following upon the questions which were asked in the House of Commons with regard to the importation of German-made gas-mantles, and the protection of the British industry [as noted on p. 101 of last week's "JOURNAL"], there was received by the House on Monday a deputation representing the manufacturers of mantles and their workpeople, who urged that the industry should be included among those scheduled in the Safeguarding of Industries Bill. They stated that German-made mantles were sent to this country at prices so much below the cost of production here that unless something was done to assist the industry, factories would have to close-down, with the result that in London alone from 4000 to 5000 people would be thrown out of employment.

SOUTH METROPOLITAN GAS BILL.

Last Thursday this Bill came before the Unopposed Bills Committee of the House of Commons, presided over by Mr. J. H. WHITLEY.

Mr. T. SEAGAR BERRY (Sherwood & Co., Parliamentary Agents) said the object of the Bill was mainly to amend the capital powers of the Company. At the time of the passing of the Company's Act of 1916, the total authorized capital amounted to £6,609,895, with £1,895,445 of loan capital, all of which had been issued. Under the Act of 1916, the Company were authorized to raise £250,000 of additional capital and £100,000 further loan capital, together with £500,000 of debentures for a period not exceeding seven years. There was also a provision that the £100,000 permanent borrowing powers should not be exercised if more than £400,000 or £500,000 of temporary loan was raised. Alternatively, if all or any part of the £100,000 of permanent loans was raised, the amount of the temporary borrowings should be reduced accordingly. The Company issued £235,396 of the £250,000 new ordinary capital and all of the £500,000 of temporary loans; and in 1918 a further Act was obtained authorizing the issue of £637,500 of additional stock together with one-third loan capital, and, in addition, another £500,000 of temporary borrowing powers, the period in this case being ten years. In the Act of 1918, there was power for the Board of Trade to extend the periods of seven and ten years for temporary borrowing for such periods as might be thought fit. None of the powers of the Act of 1918, however, had yet been exercised, presumably on account of the conditions of the Money Market. In 1920, the Company promoted a further Bill to put its financial position on a different basis; and it was hoped that the Company would shortly be able to deal with its financial position under this Act. Further capital expenditure, however, was necessary; and the present Bill proposed to repeal the powers for permanently borrowing £100,000 granted in 1916, and further, asked for powers to issue £500,000 of ordinary or preference shares to replace the £500,000 of temporary borrowing powers obtained in 1918 and not yet exercised—thus leaving the Company with borrowing powers for one sum of £500,000 only—viz., those granted in 1916. Powers were now also asked to issue redeemable preference or debenture stock—the object being to take advantage of the better Money Market which it was hoped would come about in the immediate future.

The CHAIRMAN called attention to clause 16, which reads as follows:

(1) "All Directors of the Company elected after the passing of this Act shall be persons possessing professional, technical, commercial, financial, or scientific knowledge advantageous to the conduct of gas companies.

(2) "The Chairman of the Board of Directors shall be designated the President of the Company, and the Deputy-Chairman of the Board, the Vice-President of the Company; and they shall both be persons having substantial practical or business experience in the production and sale of gas."

In answer to a member of the Committee,

Mr. BERRY said the clause was drafted by himself. The shareholders would be responsiible for the qualifications of the Directors. There already were working men members on the Board.

Dr. *Charles Carpenter*, the Chairman and Managing Director of the Company, having formally proved the preamble, the Bill was ordered to be reported for third reading.

HOUSE OF LORDS COMMITTEE.

WANDSWORTH, EPSOM, AND WIMBLEDON GAS BILL.

Thursday, April 14.

(Before the DUKE OF BEDFORD, *Chairman*, Lord REDESDALE, Lord HOOD, Lord SACKVILLE, and Lord WALSINGHAM.)

This Bill, which originally proposed to incorporate the Sutton Gas Company (a scheme which has been abandoned), deals with the question of a differential price as between the three districts and the raising new capital.

Counsel for the promoters were: Mr. TYLDESLEY JONES, K.C., and Mr. A. M. PADDON. The only opponents were the Wandsworth Borough Council, represented by Mr. E. W. WINGATE SAUL and Mr. BRUCE CAMPION.

Mr. TYLDESLEY JONES said the Bill now only proposed to raise £289,478 of new capital, and to vary section 55 of the Company's Act of 1912, which authorized the amalgamation of the Wimbledon and Epsom Gas Companies with the Wandsworth Company. It was to the latter proposal that the Wandsworth Council objected. He explained that the Act of 1912 provided that in Wimbledon the price would be reduced until it was not more than 5d. above the price charged in Wandsworth; in Epsom not more than 9d. above the price charged in Wandsworth; and as further economies were introduced, so the prices in Wimbledon and Epsom would come down. It was contemplated that the economies in connection with the supply in Wimbledon would have reduced the difference in price to 3d.; and that would actually have happened but for the war. Soon after the Act of 1912 was passed, reductions were made in the price of gas; but by the second quarter of 1915, the effect on coke of the war was beginning to develop, and for the first time the Company had to increase their price. The price in all three districts was increased by 4d.—making the Wandsworth price 2s. 1d., the Wimbledon price 2s. 8d., and the Epsom price 3s. 1d. After a reduction by 1d. subsequently, the price had again to be increased, and since 1917 increases had been made, so that to-day the price in Wandsworth was 4s. 8d. per 1000 c.ft., in Wimbledon it was 5s. 3d., and in Epsom it was 5s. 8d. Thus Wimbledon was paying 7d. more than Wandsworth, and Epsom 1s. more; and it would be impossible to give Wimbledon and Epsom the benefit of section 55 of the Act of 1912—which contemplated at least a reduction, so that the price would not be more than 5d. above Wandsworth—unless some readjustment of figures was made, because as things stood the Company could not give this benefit without a corresponding increase in the price in Wandsworth. The war had upset all calculations; and instead of the reduction of the differential prices in the case of Wimbledon to 3d., it was still 2d. above the figure mentioned in section 55 of the Act of 1912. The Company felt that this was not fair to the Wimbledon consumers, because most of the development had taken place in Wimbledon. The sale of gas in the Wimbledon area in 1914 was 839 million c.ft.; but this had risen to 1403 millions by 1920, or at the rate of 67·2 p.ct.; whereas the rate of increase in the case of Wandsworth over the same period was only 17·7 p.ct. To-day, the quantity of gas sold in Wimbledon was greater than in Wandsworth; but yet Wimbledon had received practically no benefit from the amalgamation. In Epsom in 1912, the sale of gas was 128 million c.ft.; and in 1920 this had increased by 186 millions. With a view to remedying this difficulty, it was proposed by clause 29 of the present Bill that the price in Wimbledon should not exceed by more than 5d. per 1000 c.ft., or its equivalent per therm, the price charged in Wandsworth; and in Epsom by not more than 10d. per 1000 c.ft., or its equivalent per therm. This would at once give the Wimbledon consumers the benefit in price intended under the Act of 1912—viz., 5d. above the Wandsworth price; while in the case of Epsom, the price proposed was 1d. above that named in the Act of 1912, but 2d. less than was actually being paid to-day. This was because sales had not developed so rapidly there, and equal economies had in consequence not been effected. The London County Council

which kept a very close watch on all matters appertaining to gas in the county did not oppose, nor did any of the other local authorities concerned; and it was felt that the Wimbledon consumers, having regard to the manner in which they had contributed to the development of the Company, were not getting justice. As a matter of fact, Wimbledon even now did not consider it was being treated with justice, because under the old conditions it was intended that the 5d. differential should be reduced to 3d. without the intervention of the Board of Trade, whereas under the Bill any reduction below 5d. could only take place after an application to the Board of Trade. The immediate effect of the proposal would be very slight on the Wandsworth consumers; but it was hoped that the reduction in Wimbledon and Epsom would result in an increased demand, so that reductions in price all round could be made.

Mr. *Harry E. Jones*, the Chairman of the Company, gave evidence in support of Counsel's opening statement. He said the whole object of the clause was to give justice as between the various consumers in the three areas. It was only another of the many instances in which adjustment had to be made to overcome unlooked-for difficulties due to the war. The only case against the proposal put forward by Wandsworth was that the parliamentary bargain of 1912 should not be interfered with. But the fact was that the bargain then made had not been given effect to, so far as Wimbledon and Epsom were concerned, through circumstances arising out of the war.

Mr. Wingate Saul addressed the Committee on behalf of the Wandsworth Borough Council, but did not call any evidence. His case was that under the Act of 1912. Wimbledon and Epsom secured considerable advantages; and the effect of the present proposal would be to increase the price of gas in Wandsworth for the benefit of Wimbledon and Epsom.

The Committee, however, found the preamble of the Bill proved, and ordered it to be reported without amendment, for third reading.

HOUSE OF COMMONS COMMITTEE.

Tuesday, April 12.

HARROGATE GAS BILL.

(*Before Sir* Francis Blake, *Chairman, Major* Malone, *Mr.* Mallalieu, *and Mr.* Evan Davies.)

This Bill, which is promoted by the Harrogate Gas Company, provides for the consolidation of the present A, B, and C stocks into one class of stock as from Jan. 1, 1922. The Company seek powers to raise additional capital not exceeding in the whole £120,000 by the issue of consolidated stock or new preference shares or stock. The Bill contains provisions as to the supply and testing of gas in accordance with the provisions of the Gas Regulation Act. The basic price of gas is to be one shilling and two-fifths of a penny per therm, and the maximum price one shilling and one and three-fifths pence. The dividend on the consolidated stock is limited to 10 p.ct.; a discount of 10 p.ct. is to be allowed to consumers upon payment within fourteen days of the delivery of the account for gas supplied; and any surplus balance of the net revenue account after the payment of dividends is to be applied to the making of rebates to consumers. The Board of Trade have power, on the recommendation of the Company or local authority, to vary the basic and maximum prices of gas supplied in so far as the costs of production and supply may alter. The Bill also provides for the creation of a new reserve fund, and an employee co-partnership scheme.

Mr. Tyldesley Jones, K.C., after briefly stating the objects of the Bill, said there were originally two petitions against—one by the North Eastern Railway Company, upon which, however, there was no appearance; and the other by the Corporation of Harrogate. So far as the Corporation petition was concerned, all points had been settled except one. The Bill involved questions which necessitated careful examination of the estimates of the Company; and in this the Corporation had had the assistance of Mr. William Cash (who was an experienced gas engineer, as well as an accountant), with the result that the price to be charged per therm had been settled, as well as the question of capital and things of that sort.

Recounting the history of the Company, Mr. Tyldesley Jones said that a Harrogate Gas Company was incorporated in 1846. The limits of supply of the Company covered Harrogate and a large area around, about ten miles long and twelve miles wide. The area was supplied by the present Company to-day. In 1863, the Company was re-incorporated; and by that and later Acts the capital was regulated and the dividends fixed. Under these last Acts the Company was a sliding-scale company, with a standard price of 5s. 6d. per 1000 c ft. The sliding-scale had been found to operate very satisfactorily before the war; but owing to the increased cost of production since then, it had been found by all gas companies absolutely unworkable. As a result, a Bill was introduced last year by the South Metropolitan Gas Company, under which very material alterations were made in the method of charging. The South Metropolitan Company were allowed to charge a sum on the heat-unit basis which would recoup them for the increased cost of production brought about by the war, and also put them back into their pre-war dividend-paying state. This was substantially what the Harrogate Bill was asking for the Harrogate Gas Company. The Company even to-day were supplying gas at 4s. 2d. per 1000 c.ft., which was an extraordinarily low figure for a company supplying such an area; and from this the inference could be drawn that it was a well-managed company. This inference could also be drawn from the fact that when a company came to Parliament asking for further powers was the time when complaints were made against it. But in this case all the matters which could be arranged by the opponents had been satisfactorily disposed of. They had agreed with the Corporation that in future the maximum price should be 1s. 1⅜d. per therm; and the basic price 1s. 0⅜d. The object of the basic price was that if hereafter the Company sold gas at a lower figure than the basic price, they could, for every one-fifth of a penny per therm by which the selling price was reduced, appropriate out of the profits of the Company a certain sum—not for the shareholders, but for the benefit of the employees of the Company. They were starting a co-partnership fund. As originally deposited, the Bill asked that if the price of gas were reduced below the basic figure, certain amounts might be taken from the profits for the benefit of both the shareholders and the employees; but the provision in respect of the shareholders had been struck out. It had been agreed that for every one-fifth of a penny by which the price of gas fell below the basic figure, the Company should take ½ p.ct. of the aggregate amount of the salaries and wages of the employees—not exceeding in the total 6 p.ct. upon the salaries and wages—and should carry the amount to a co-partnership fund. It was recognized by all parties that it was to the advantage of the consumer and the Company that the workmen should have a real interest in the economic working of the Company. With this alteration, the Bill had been modified slightly; and the Company were now unable to pay more than 10 p.ct. dividend upon the consolidated stock, into which the existing stocks were to be converted.

As to the conversion of the stock, there were three different classes, which bore different rates of dividend—each rate being subject to increases under the sliding-scale. This was inconvenient, because it depreciated the selling value of the stock in the market, and was a disadvantage when issuing further capital. It was proposed to consolidate these stocks into new stock which would give the shareholders the same return as they had had for the three years prior to the war. This return was 1 p.ct. less than the Company could, in fact, have paid at the price at which the gas was then being sold. He wished to make it clear that the stock was converted on the basis of 10 p.ct., which would simply give shareholders the same return as before the war; but this 10 p.ct. was 10 p.ct. on the nominal value of the stock.

The only point upon which opposition arose was in respect of clause 49, which provided that the Company should supply gas to premises situated within 50 yards from any main of the Company, and provide and fix a meter and pipes which might be necessary for the purpose. Under this clause the Company retained the option as to whether the consumer should repay the Company the cost incurred in providing and fitting pipes and meters, or agree to receive a supply of gas for a period of at least four years of such an amount that the rent payable should not be less than 25 p.ct. per annum on the outlay incurred by the Company. The point was that it cost money to lay a main to a house situated 50 yards from the main; but companies were always prepared to lay the necessary pipes so long as they secured a return on the expenditure incurred. A yearly tenant, for instance, might require a supply of gas; but if another tenant occupied the premises, he might prefer electricity. The Gas-Works Clauses Act, 1871, provided for this, and stated that if a consumer within 25 yards of a main required a supply, the gas companies were to supply on receipt of a guarantee of a return for a certain period. The Company were under such an obligation in their 1863 Act; but the distance stated there was 50 yards, and they were retaining the same distance in the present Bill. The Bill provided, however, that the consumer should either pay the cost or agree to take a supply for a certain period, at the option of the Company. The Corporation said that no case could be made out for differentiating the Company's undertaking from that of any other in this respect. But the Company submitted that they were extending the distance from 25 to 50 yards; and they should, therefore, have the option of deciding the mode of payment. Under the Company's existing Act, they were compelled to lay pipes, &c., to premises within 50 yards, provided they had a guarantee for two years of 20 p.ct. on the cost. Two years, however, was too short a period; and they asked for four years. Their existing Act, therefore, was altered in three respects—namely, that the two years should be altered to four; that the 20 p.ct. should be altered to 25 p.ct. (the Bill originally asked for 30 p.ct., but they were willing to take 25 p.ct.); and that they should have the option of deciding the method of payment. He thought the Corporation really objected to the option being exercised by the Company.

Mr. Parker (Messrs. Sharpe, Pritchard, & Co., Parliamentary Agents) said that the Corporation did not see any justification for the clause at all.

Mr. Tyldesley Jones suggested that they might agree, if the consumer were given the option of deciding. This would prevent its unfair use by the Company.

Mr. Parker, after conferring with representatives of the Corporation, said that the course proposed was one they could accept, and suggested that the words: "Such owner or occupier as the case may be" be substituted for the "Company."

The clause was finally passed in the following form:

Section 66 (Company to Supply Gas in Certain Events at Request of Owner or Occupier) of the Act of 1863, and section 39 (Amending Section 66 of Act of 1863) of the Act of 1909 are hereby repealed, and in lieu thereof the following provisions shall have effect:

(1) The Company shall, at the request in writing of the owner or occupier of any premises situate within 50 yards from any main of the Company, give and continue to give a supply of gas to such premises, and they shall provide and fix or lay a meter and any main or extension of main and any service pipe that may be necessary for such purpose subject to the conditions following:

Every owner or occupier requiring a supply of gas shall serve a notice on the Company at their office specifying the premises in respect of which such supply is required and the day (not being an earlier day than a reasonable time after the date of the service of such notice) upon which such supply is required to commence and shall (at the option of such owner or occupier as the case may be) either—

(*a*) Repay to the Company the cost incurred by them in providing, fixing, and laying such meter and main or extension of main as aforesaid, and so much of such service pipe as aforesaid as shall be laid upon private property or in any other case beyond 30 ft. in length;

(*b*) Enter into a written contract with the Company (if required by them to do so) to continue to receive and pay for a supply of gas for a period of at least four years of such an amount that the rent payable for the same shall not be less than 25 p.ct. per annum on the outlay incurred by the Company in providing and fixing and laying such meter and main or extension of main and service pipe as aforesaid,

and in either case give to the Company (if required by them so to do) security for the payment to them of all moneys which may become due to them by such owner or occupier in respect of any such meter, main, or extension of main or service pipe provided and fixed or laid by the Company, and in respect of gas to be supplied by them.

(2) Notwithstanding anything contained in this section, it shall be lawful for the Company in any case in which they may think fit so to do, to provide at their own expense any such meter as aforesaid, and the whole or any part of so much of any service pipe as shall be laid beyond 30 ft. in length.

(3) Section 11 of the Gas-Works Clauses Act, 1871, shall not apply to the Company.

Other interesting clauses passed by the Committee, are:

CLAUSE 30 [COMPOSITION AND PRESSURE].

(1) The gas supplied by the Company shall not contain any trace of sulphuretted hydrogen when tested as provided by the section of this Act of which the marginal note is "Provisions as to Testing, Etc."

(2) The gas supplied by the Company shall be supplied at such pressure in any main or in any pipe laid between the main and the meter having an internal diameter of 2 in. or upwards as to balance a column of water not less than

(*a*) in the case of gas supplied to any premises situate at a lower level than 200 feet above Ordnance Datum 1½ inches in height; and

(*b*) in the case of gas supplied to any premises situate at any higher level than as aforesaid, when the declared calorific value of the gas is as specified in the first column of the next following table the height specified opposite thereto in the second column of that table:

Number of British Thermal Units comprised in Declared Calorific Value.	Height of Column of Water.
Not less than 350	2 inches.
Less than 350, but not less than 300	2½ inches.
Less than 300	Such height (not being less than 3 inches) as shall be prescribed by the Gas Referees.

(3) The foregoing provisions of this section shall not apply as respects power gas or any separate supply of gas by the Company for industrial purposes only.

CLAUSE 31 [PROVISIONS AS TO TESTING, ETC.].

(1) The powers of the Gas Referees under section 5 [Power to Prescribe Tests] of the Act of 1920 shall extend to enable them to prescribe—

(*a*) the times at which and the apparatus and (which shall include a calorimeter for the production of a continuous record of the calorific value of the gas which is being supplied) method by which tests shall be made to ascertain whether the Company are supplying gas in accordance with their obligations; and

(*b*) the method by which any such apparatus shall be verified; and

(*c*) the time and form of the reports to be made by the Gas Examiner to the Gas Referees and to the Local Authority by whom he was appointed, and to the Company; and the means by which the results of the tests shall be made available to the public.

(2) Notwithstanding the repeal by this Act of section 37 [Testing of Gas] of the Order of 1897, the Company shall maintain the testing-place provided at their works pursuant to that section; and the said testing-place is hereinafter referred to as the "prescribed testing-place." Provided that the Gas Referees may, if they think fit, prescribe an additional testing-place or additional testing-places, and in the event of their so doing the testing-place or testing-places so prescribed shall be deemed to be included in the expression the "prescribed testing-place" where used in this Act.

(3) The Company shall to the satisfaction of the Gas Referees provide and maintain at the prescribed testing-place the prescribed apparatus, and shall give the Gas Examiner access to the prescribed testing-place for the proper execution of his duty.

(4) A representative of the Company may be present on any occasion on which the Gas Examiner inspects, alters, adjusts, or replaces the testing apparatus or tests the gas, but shall not interfere with the inspection, alteration, adjustment, replacement, or testing. For the purposes of this subsection, the Gas Examiner shall if the prescribed testing-place is situate elsewhere than on the works of the Company give to the Company reasonable notice of the time at which he will attend at the testing-place.

(5) The Gas Referees may at any time when it appears to them necessary for the proper execution of their duties enter upon and inspect any of the works of the Company, and the Company shall afford them and their assistants full facilities for that purpose, and shall furnish the Gas Referees with such information with regard to the position of the mains and pipes of the Company and with regard to any other matter as the Gas Referees may reasonably require.

Clauses 32, 33, and 34 apply to the Company various sections of the Gas Regulation Act in relation to appeals to the Chief Gas Examiner, contributions to the remuneration and expenses of the Gas Referees, and penalties for failure to comply with the prescriptions of the Gas Referees.

The Bill was ordered to be reported for third reading.

LEICESTER CORPORATION BILL.

This Bill came before Section A of the Local Legislation Committee of the House of Commons on Tuesday, April 12—Sir WILLIAM MIDDLEBROOK presiding.

Part II. of the Bill, which deals with gas, seeks further powers in respect of the gas undertaking of the Corporation as to the maintenance of the gas-works, the conversion of residual products, the construction and placing of gas-pipes, and the application of the gas revenue.

Counsel for the Bill were Mr. FREEMAN, K.C., and Mr. F. N. KEEN.

Mr. FREEMAN, in opening, said that clause 57 authorized the Corporation to construct additional gas-works. The area upon which the works were to be erected was 81 acres, the property of the Corporation, although it could not be used for gas-works without the sanction of Parliament. The gas undertaking in Leicester embraced two distinct plants, one the Aylestone Road works and the other the Belgrave Gate works—the latter being much smaller than the former. The total productive capacity of the two works was 11½ million cubic feet per day, and there was no available room for expansion. It was, therefore, absolutely essential to have further land upon which to extend the works. The Corporation were seeking powers to borrow £900,000 for the purposes of the gas undertaking, which, judging from their experiences in the past, would last about ten years. There were two petitions against this part of the Bill, one of which was from an adjoining manufacturing firm, which had fears that the new works would cause dust and dirt in their own works. But they were not appearing, so he presumed they were satisfied. The other petition was on behalf of various railway companies, asking for protective clauses. He had hopes, however, that the Corporation would be able to arrange terms with the companies. He believed the railway companies which had anything to say about the gas part of the Bill had not instructed Counsel.

Mr. *Hubert Pooley* (Engineer and Manager of the gas undertaking) said he had carried out considerable extensions of buildings and plant, and alterations and renewals, which had cost large sums of money. Among the extensions and alterations were the laying of 32 miles of mains of various sizes; a complete vertical-retort installation of a capacity of 2½ million cubic feet per day; the displacement of other plant; and a set of four purifiers, each measuring 40 ft. square by 6 ft. deep. In 1902 the late Engineer estimated for an expenditure of £210,000 in buildings and works, and powers were granted in the Corporation Act of 1902 for the raising of £500,000 for the purposes of the undertaking. Of this sum £136,288 still remained, of which a small amount had been borrowed. The difference had been expended on new mains and meters and work at Aylestone Road. The 81 acres which the Corporation had acquired were suitable for gas-works purposes. Powers were sought to produce power gas, and also to carry on the business of chemical manufacturers on the site.

Dealing with the history of the undertaking, witness said that the gas-works were acquired by the Corporation under their Act of 1878, in which year the gas delivered was 518 million cubic feet. In 1901 the gas delivered was 1780 millions; in 1909, 2100 millions; and in 1920, 2653 millions. The balance of capital remaining to be borrowed was £123,800, and the balance borrowed but not expended was £12,488—making the total of £136,288. The total expenditure from the time of the transfer from the old Company to the Corporation in 1878 to the end of last year was £989,156. The maximum daily capacity of the two existing works was 11½ million cubic feet of coal gas plant, 6 million cubic feet of water gas plant, without allowing any margin whatever for stand-by plant and for repairs. The necessary stand-by plant should be one-third of the total; and he advised that this amount should be provided. The capacity of the Aylestone Road works was 9 million cubic feet of coal gas; and all the carburetted water gas was manufactured there. With the modern developments in gas manufacture it was possible to produce on this site 18 million cubic feet, as against 9 millions, and 10 million cubic feet of carburetted water gas, as against 6 millions. It was necessary, however, to purify and store the increased quantity manufactured; and for this purpose, they must have more land. The cost of putting in coal-gas plant with a maximum capacity of 5 million cubic feet per day, with the necessary buildings and connections, would be £900,000, made up as follows: Vertical retort house, £225,000; coke handling and storing plant, £75,000; condensers, £15,000; boilers and exhausters, £30,000; scrubbers and washers, £45,000; wells and pumps, £25,000; purifiers, £105,000; meters, £30,000; gasholder and tank, £300,000; contingencies, £50,000. The vertical retort house would contain 160 retorts, capable of carbonizing 400 tons of coal daily, making 5 million cubic feet of gas daily. The schedule also included the cost of the necessary buildings. Assuming an increase of output of 3½ p.ct. per annum, which was the average of former years, the sum asked for would be sufficient to last ten years, by which time he had calculated that a further sum of £260,000 would have been paid off existing loans, and £130,000 off the sum now asked for—a total of £390,000. The capital debt of the undertaking would then stand at £1,428,000; and the estimated sale of gas would be 3600 million cubic feet per annum.

In reply to Mr. EDGAR HORNE (a member of the Committee), witness said other clauses in the Bill provided for working capital which would assist the undertaking in connection with the increased cost of coal. As to the amount of coal expected to be used. In 1913 the undertaking used 185,000 tons; and in 1919, 139,000 tons—a saving of 46,000 tons. The method of producing gas by vertical retorts reduced the quantity of coal necessary. As to the average amount of coal to be kept in store, there was at present about 30,000 tons; but at the end of ten years, with the anticipated increased output, it would probably be necessary to hold 50,000 or 60,000 tons normally. With the cost of coal at (say) 45s. per ton, the undertaking needed £60,000 or £80,000 for coal stocks.

Mr. HORNE asked whether the buildings for dealing with residuals had been accounted for in the £900,000.

Witness replied that provision had been made for them.

Mr. LAW (a member of the Committee) said that the figure of £900,000 for ten years seemed to be a very much increased rate of expenditure per annum compared with the last forty years. During that period the undertaking had spent about £27,000 per annum; and they were now going to spend about four times the amount.

Witness agreed, but said that it was due to the increased cost of labour and materials, and to the increased demand for gas.

Major BOYD CARPENTER (a member of the Committee) asked whether any estimate had been made as to what the increase in the rates would be.

Witness said that the undertaking had never come on to the rates; and they did not anticipate that it would do so.

Asked by Mr. HORNE whether there was any limit to the price charged for gas,

Witness said there was no limit at the moment.

With regard to clause 58, dealing with the construction and placing of gas-pipes, &c.,

Mr. Keen said the Home Office had reported that the clause differed from the Model Bill and Clauses. Sub-clause (1) of the clause in the Corporation's Bill would enable the Corporation to specify the size and material of all pipes and fittings to be laid by the consumer on his own premises, whereas the model applied only to pipes and fittings between the main and the meter which were to be covered over. Again, sub-clause (4) of the Bill provided that every meter to be used in a building not previously supplied, or in connection with a new or substituted pipe laid by the consumer between the main and the meter should be placed as near as reasonably practicable to the main. The words "but within the outside wall of the building" had been omitted from the end in this case; and the Home Secretary recommended that the Corporation should be required to follow the model form. Sub-clause (1) of clause 58 reads as follows:

> "The Corporation may specify the size and material of the pipes with the fittings thereof which are to be laid by the consumer either in the first instance or on the occasion of any renewal (*a*) on his own premises or (*b*) [so far as such pipes and fittings are intended to be covered over] between the mains of the Corporation and the meter."

The Model Bill reads:

> ". . . on his own premises either in the first instance or on the occasion of any renewal between the Corporation's mains and the meter (so far as such pipes and fittings are intended to be covered over)."

The model clause, said Mr. Keen, was limited to the pipes between the Corporation's mains and the consumer's meter, in so far as the pipes were intended to be covered over; but in the Corporation's clause it was extended to apply to all pipes and fittings laid or renewed on the consumer's own premises, or, so far as they were intended to be covered over, between the mains of the Corporation and the meter. There was a precedent, although the wording was not exactly the same, in the Salford Corporation Act of 1900, in which powers were given on the consumer's premises beyond the meter, but it only applied to any pipes that were covered over.

The Chairman said that at present the Leicester Corporation could not settle the design of a chandelier; but under this clause they would be able to do this.

Mr. Keen agreed.

Mr. *Pooley* said they were endeavouring to prevent in the future the possibility of people laying down pipes indiscriminately in consumers' houses. In Leicester, the custom had been to lay iron pipes in all cases; and they had, so far as their fittings were concerned, no escapes in consumers' houses, except where lead or composition pipes had been used by others. They desired complete control over the specification for pipes so that they might cause their clients as little disturbance and risk as possible.

In answer to Mr. Horne,

Witness said he wanted to educate the consumers. The Corporation's legal responsibility ended when the gas had passed through the consumer's meter; but so far as their responsibility to the industry was concerned, it did not end until the consumer had burnt the gas. They wanted to save any risk of leakage and the consequent danger, and also the cost of putting things right again. In many cases the effect of the great development of the use of gas for heating and cooking, &c., had been that the pipes were inadequate for the increased supply, with the result that the consumers complained. This would have been avoided if the pipes and fittings had originally been made suitable. There was also a great deal of defective workmanship through the people who put in fittings not having good judgment as to the type of fittings and the way the work should be done.

Mr. Keen, referring to sub-clause (4), said this read as follows:

> "Every meter to be used in a new building or a building not previously supplied with gas, or in connection with a new or substituted pipe, laid by the consumer between the main and the consumer's meter, shall be placed as near as reasonably practicable to the main."

In the Model Bill the words "to the outside wall of the building" were used, instead of the words "to the main." The reason was that frequently on a large estate, if they had to take the meter to the outside wall of the building they would have a very long distance on the consumer's land between the wall and the main; and there might be leakage before reaching the meter. It had been the practice on such estates to place meter-houses as near as practicable to the main. The Corporation could also decline to supply to a house situated more than 30 ft. from the main, unless the consumer paid the cost of the service pipe beyond the 30 ft.

Mr. Horne pointed out that the consumer could put the meter where he liked.

Witness said that in making their arrangements they had always insisted that the meter-house should be put near the street. This had been part of the bargain; and they had never had any difficulty in regard to the rule.

The Chairman: Then you do not need the power?

Witness said they never knew when they might need it.

The Chairman said with regard to clause 57, the Committee granted that, subject to considering the exact wording, clause 58 must follow the Model Clause.

Dealing with clause 59, as to the application of gas revenue,

Mr. *William Penn-Lewis* (Treasurer of the City of Leicester) said that under the Leicester Corporation Gas and Water Transfer Act, 1878, the revenue of the gas undertaking was directed to be applied in certain ways. Under the Borough of Leicester Extension Orders Act, 1891, the amount of the reserve fund was increased from £5000 to £50,000. Later it was found that £50,000 was not sufficient; and the Leicester Corporation Act, 1913, raised the figure to £150,000, which was the present limit. In addition, the Corporation were empowered in 1884 to form a Gas-Works Renewal Fund not exceeding £20,000. Owing to the altered value of money, however, it was found necessary that the fund should be increased to £150,000; and this they asked to do under the Bill—the reserve fund remaining at £150,000.

The clause was postponed in order that provisions as to an accident fund might be dealt with

MISCELLANEOUS NEWS.

"B.C.G.A." CONFERENCE AT HALIFAX.

The Yorkshire Section of the British Commercial Gas Association held a conference at the Halifax Town Hall on Wednesday last, under the auspices of the Halifax Corporation Gas Committee. Alderman Waddington, the Chairman of the Gas Committee, presided; and an official welcome was extended by the Mayor (Alderman T. Hey, J.P.).

The Chairman, in his opening address, said the work of the Association was to spread education as to the highest, best, and wisest functions of gas. By using gas for lighting, heating, and power purposes, they were helping to conserve the national coal supply.

Mr. F. H. Beckett, Housing Expert to the Association, introduced a discussion on the "Application of Gas in Relation to Housing." He had been to see new houses erected by the Halifax Corporation, and was sorry that practically no advantage had been taken of the opportunity to move the clock forward towards better times, so far as the utilization of gas was concerned. Indeed, without unfair criticism, these houses represented a decided step backwards in that respect. They had only been provided with a gas wash-copper. When it was generally accepted all over the country that gas was the best application of fuel, and was of great assistance to the housewife in carrying out her difficult duties, it was regrettable that more careful consideration should not have been given to the adoption of gas in the equipment of new houses. Commending the "built-in" gas-fire, in conjunction with the economy flue, for the heating of houses, he claimed that, besides effecting smoke abatement, it showed a very substantial saving in fuel. He urged the adoption in houses of the gas-cooker and wash-copper. These in several housing schemes had been sanctioned, as had the "built-in" fires, by the Ministry, provided they were fixed instead of the coal apparatus, and not in conjunction with it.

Mr. Ralph Halkett (Sheffield) mentioned that in his city the gas-cooker and the wash-copper were being installed in the new municipal houses, at a rent charge for the tenants. There had, thus far, been a difficulty in persuading architects to adopt gas-fires. He was hopeful, however, that these would yet receive attention. Gas undertakings, by demonstrating the great advantage of gas for domestic use, ought to be able greatly to extend the demand.

Mr. C. S. Shapley (Leeds) reported that, in the new houses there, many had been equipped with gas-fires, as well as the gas-cooker and the wash-copper; but they were a compromise, having no economy flues. No opportunity must be lost in keeping before the public the commodity and uses of gas. What Halifax had done regarding propaganda was on the right lines.

Mr. R. Watson (Doncaster) complained of the inadequate aid given by the Treasury in regard to providing houses with gas appliances.

Mr. Beckett, in concluding the discussion, emphasized that, where a town itself was clean, the effect of blackening the ceilings of houses was infinitesimal.

Afterwards luncheon was partaken of at the White Swan Hotel.

In the afternoon, Alderman Waddington presided over a large public meeting in the Town Hall.

Mr. Beckett gave an address on "Gas Equipment in Relation to Modern Housing Schemes," in the course of which he said housing authorities all over the country were responsible for a very solemn trust—to build and equip these new houses in conformity with modern requirements. No builder ever had such a splendid opportunity for providing excellent homes; and in the fulfilment of this laudable aim, the gas undertakings all over the country must necessarily play an important part. The gas cooking-stove stood for the very best utilization of modern science in the all-important domestic duty of preparing food; and it was difficult to realize that any house, having gas available, could be considered properly equipped were it not furnished with this efficient cooking apparatus, which had practically superseded the kitchener, with its accompaniment of ashes, soot, flue cleaning, and never-ending drudgery. Gas undertakings were anxious to fulfil their public service; but many housing authorities had a wrong conception of what this entailed, forgetting, or seemingly forgetting, that there were two sides to the bargain, which, placed in their correct order, were: First of all, their duty to their customer, and, secondly their duty to their shareholders. A great number of the authorities considered that their duty finished under the first heading, and had expected them to receive with enthusiasm the offers of new business on terms which could only mean large financial loss to the gas undertaking and an increased charge to their existing consumers, as this loss would be reflected in the price of gas. If this uncommercial-like proposition had not been accepted in some cases, it had been proposed to delete gas altogether from the housing schemes. When it was considered that these houses were costing anything from £800 to £1200 each, surely it would not be too much to pay at least £30 per house for a labour-saving gas installation, particularly when it was remembered that the economy gas-flue could save the whole of the amount. Excellent offers from gas undertakings had been refused, with the result that there were many schemes progressing towards completion without any provision for gas being made, or contemplated. Happily, however, most of the housing authorities had realized the importance of the gas service, and had made proper provision for its installation. It was to those who had not yet realized the prominent part that gas played in the home that, without fear of contradiction, he said that without gas—where it was available—houses which might possibly let at the present time through shortage would become a drug on the market as soon as the building arrears were caught-up, and the private builder had seriously got to work. The builder studied public requirements for commercial reasons; so that he was not likely to fall into the errors of judgment. He would naturally see that gas played a prominent part in the equipment of his houses. A typical example of this could be seen on the outskirts of London. On the one hand, the public authority were building houses without any provision for gas. Alongside was an up-to-date builder, erecting moderately cheap

houses for quick sale. Knowing what the public required, he was installing gas for cooking—"built-in" gas heating stoves with economy flues, and gas water-heating apparatus; and he was selling the houses as quickly as they were built. Many of the authorities were alive to the possibilities of gas to economize labour and building costs. For example, "built-in" gas-fires, with economy flues, were being installed in Manchester, Liverpool, Ormskirk, Shrewsbury, and by the London County Council for most of their big housing schemes, with the result that considerable saving was being made in building construction through the use of the economy gas-flue, first advocated by the "B.C.G.A." In conclusion, he reiterated that gas undertakings were both willing and eager to carry out their public duty, not only in the letter but in the spirit, if they only received the reasonable financial co-operation of the housing authorities and were offered at least a commercial proposition. It should be undoubtedly a matter for mutual agreement between the housing authorities and the gas undertakings, both doing their very best to provide the gas installations, which were essential to make these new houses real homes for women to live and work in, by so doing enabling them to enjoy the assistance of this applied science in their never-ending tasks.

Mr. Lea (Halifax Borough Analyst) said that, from a scientific point of view, it was absolutely proved that a gas-fire, put in correctly and properly regulated, gave better ventilation than an open coal fire.

Others taking part in the discussion were Mr. W. M. Mason (the General Manager of the Association), Mr. W. B. M'Lusky, of Halifax, and Mr. W. J. Smith, of Bolton.

In the evening a further public meeting was held, when an address was given by Mrs. M. A. Cloudesley Brereton, on "The Use of Gas and Its Effect Upon Domestic Service." Lady Fisher-Smith, J.P., of Halifax, presided over a good attendance.

PROTEST AGAINST GERMAN DUMPING OF GAS-MANTLES.

At a mass meeting held at the Wandsworth Town Hall, presided over by Lieut.-Col. Sir John Norton-Griffiths, M.P., the following resolution was unanimously adopted: "That this public meeting of the electors of Wandsworth and Streatham, representing over 4000 gas-mantle workers, draws attention to the serious unemployment in the gas-mantle industry, caused by the importation of gas-mantles from abroad, and demands that the industry be reinstated in the list of key industries, and be protected in accordance with the promise of the Government at the last election." It was stated that, during the previous week, a million gas-mantles were imported into this country from Germany, and the meeting was held primarily to protest against the mantle industry being ruined by unfair foreign competition.

Sir J. Norton-Griffiths said that the meeting had been called at the instance of the Joint Industrial Council of the Gas-Mantle Industry; and the object of the gathering was to direct the attention of the Government to the present deplorable state of the industry, and to consider what steps should be taken to secure its reinstatement in the Key Industries Bill. He hoped the Government would redeem their promise in connection with this matter. He proceeded to read a letter from Mr. Samuel Samuel, M.P., stating that he was thoroughly in favour of the objects of the meeting, and promising to do all in his power to have them brought into effect.

Mr. Bark (Chairman of the Joint Industrial Council) said that, prior to 1914, the gas-mantle industry was dominated by the Germans to such an extent that, in this country, there was hardly a gas-mantle company that was paying its way, or at any rate paying a dividend. This was due to the fact that the Germans erected large factories in this country, and sent over from Germany partly-manufactured goods, which were finished here and sold as British goods. Large quantities of mantles were disposed of here at less than they were sold for in Germany. It was through this unfair competition that the gas-mantle industry sunk to the position it occupied in 1914. The Germans were now sending their mantles through Holland and Switzerland; and they were labelled as of "Dutch Manufacture" or "Swiss Manufacture." Unless the gas-mantle industry was reinstated in the Key Industries Bill, it looked as if the industry would gradually die.

Mr. Austin said that one of the most staggering facts which confronted them was that no fewer than a million gas-mantles were imported from Germany into the country in one week. The manufacture of these mantles would have provided full employment (say) in the "Ironclad" factory for six weeks or two months, during which the making would have disbursed in wages between £8000 and £9000. This money was entirely lost to England; and our workers would derive absolutely no benefit from these million imported mantles. Many people might ask why the industry was in such a critical condition. Some might even suggest that German mantles were superior to those manufactured in this country, or that the German factories were run on more efficient and scientific lines than the British factories. But there was no foundation for either of these suggestions. He had been connected with the gas-mantle industry for sixteen years, and he had seen mantles made by all nationalities. These mantles had been subjected to very severe tests, in order to compare them with the British-made article; and he could unhesitatingly say that the British-made mantle was at least as good as, if not better than, the foreign-made stuff which was now being foisted upon us. In Germany, girls were being paid 2½d. per hour, while in this country they received 9d. How was it possible to compete with such a rate of pay as that now being paid in Germany? It was absolutely impossible.

Mr. Scott (Vice-Chairman of the Joint Industrial Council) protested against the trickery of the Government in not having kept their promise to include the gas-mantle industry in the Key Industries Bill; and Mr. Garland said that all they needed was fair competition.

Sir J. Norton-Griffiths said that what they wanted in this country was not Tariff Reform or Free Trade, but fair trade. Unless the mantle industry was reinstated in the Key Industries Bill, thousands who were now employed in the Wandsworth district would be unemployed and starving.

The resolution was carried unanimously; and a telegram embodying the motion was ordered to be sent to each member of the Cabinet.

GAS REGULATION ACT APPLICATIONS.

The following further notices have appeared in the "London Gazette" of applications by gas undertakings to the Board of Trade for Orders under the Gas Regulation Act.

Chasetown Gas Company.

The maximum price now authorized in respect of the supply of gas by the undertakers is 5s. per 1000 c.ft.; and the price which they have asked the Board of Trade to substitute for this is 1s. 11d. per therm.

Hoddesdon Gas and Coke Company.

The standard price now authorized in respect of the supply of gas by the undertakers is 5s. per 1000 c.ft.; and the price which they have asked the Board of Trade to substitute is 1s. 7d. per therm.

Pudsey Coal Gas Company.

The standard price now authorized in respect of the supply of gas by the undertakers is 3s. 1d. per 1000 c.ft.; and the price they have asked the Board of Trade to substitute for this is 1s. 4d. per therm.

Reading Gas Company.

The maximum prices now authorized in respect of the supply of gas by the undertakers and the prices which they have asked the Board of Trade to substitute are as follows:

—	Present Maximum Price per 1000 C.Ft.	Proposed Price per Therm.
	s. d.	d.
Within the Borough of Reading	3 9	16·76
Without the Borough of Reading, but within one mile of the boundary of the borough—		
To consumers of less than 20,000 c.ft. half-yearly	5 3	20·66
To consumers of 20,000 c.ft., but less than 40,000 c.ft. half-yearly	5 0	20·01
To consumers of 40,000 c.ft. or upwards half-yearly	4 9	19·36
For gas supplied to public lamps	4 5	18·50
Without the borough beyond one mile of the boundary of the borough—		
To consumers of less than 20,000 c.ft. half-yearly	5 6	21·32
To consumers of 20,000 c.ft., but less than 40,000 c.ft. half-yearly	5 3	20·66
To consumers of 40,000 c.ft. or upwards half-yearly	5 0	20·01
For gas supplied to public lamps	4 8	19·15

St. Neots Gas and Coke Company.

The standard price now authorized in respect of the supply of gas by the undertakers is 4s. 7d. per 1000 c.ft.; and the price which they have asked the Board of Trade to substitute for this is 1s. 7d. per therm.

Stroud Gas Light and Coke Company.

The maximum price now authorized in respect of the supply of gas by the undertakers is 4s. 6d. per 1000 c.ft.; and the price which they have asked the Board of Trade to substitute for this is 1s. 9d. per therm.

DECLARATION OF CALORIFIC POWER.

The following further companies have intimated the calorific power of the gas they intend to supply:

Cardiff Gas Light and Coke Company.—470 B.Th.U. (April 30).
Colchester Gas Company.—470 B.Th.U. (May 1).
Gas Light and Coke Company.—475 B.Th.U. (April 18).
Ipswich Gas Light Company.—450 B.Th.U. (April 9).

SPECIAL ORDERS UNDER SECTION 10.

Hessle Gas Company.

Application is to be made to the Board of Trade for a Special Order, to change the name of the Company; to extend the limits of supply; to purchase additional lands; to raise additional capital; to prescribe basic rates of dividends and basic prices per 100,000 B.Th.U., and to authorize and provide for the distribution of profits among the holders of stock in excess of the basic rates of dividends and for the benefit of the Company's employees and their dependents, when the price of gas does not exceed the basic prices; to make special provision with reference to overdriving meters and high-pressure air-blasts; to confer powers in regard to the supply of gas for power purposes; and to make provisions with reference to the charges to be made for and the conditions to be observed in connection with the supply of power gas; and for other purposes.

Wisbech Gas.

The Company are applying to the Board of Trade for a Special Order to increase capital and borrowing powers and for provisions as to new ordinary and preference capital; the issue of redeemable preference shares or stock and redeemable debenture stock; and the repeal and amendment of Acts.

Stokers' Wages at Arbroath.—It was reported to the Arbroath Town Council last week, in connection with the gas-workers' wages, that (after consideration between the workers and the National Gas Council's representatives) it had been agreed to divide the different towns into zones and grades; and that Arbroath had been placed in Zone 1, Category B. It was stated that the rate of wages for Arbroath stokers would be increased from 12s. 10⅔d. per eight hours to 13s. 7⅓d. per eight hours (pre-war, 4s. 11d.), and the labourers from 1s 5⅔d. per hour to 1s. 6½d. per hour (pre-war, 5½d.). The new rates will be retrospective, as from Jan 1.

GAS FOR LONDON HOUSING SCHEMES.

Among the reports to be submitted at yesterday's meeting of the London County Council was one by the Housing Committee, who stated that negotiations with the Brentford Gas Company for the supply of gas to the houses on the Roehampton Estate resulted in the Company agreeing to lay the gas-mains on the estate free of cost to the Council, and, subject to a payment of £10 a house, to provide and maintain a gas installation within the houses, including a gas cooking-stove and meter in each house, but omitting burners. These terms were approved by the Minister of Health, as well as a proposal for the Council to bear the expense—estimated at from 45s. to 50s. a house—of certain incidental work which the Company, owing to labour difficulties, declined to undertake. The total expenditure for the whole estate, comprising 1182 houses, is estimated not to exceed £14,800, or, approximately, one-half that involved in the provision of an electric light installation. Appropriate provision has been made in the capital vote on account for the current financial year.

The Committee have authorized, subject to the approval of the Minister of Health, an arrangement being entered into with the Tottenham District Light, Heat, and Power Company for the supply of gas to houses on the White Hart Lane Estate to be extended to the new houses which are being erected, with the necessary mains, service-pipes, fixtures, and fittings (including gas-stoves), subject to the Council paying £7 a house towards the cost of the installation.

SCOTTISH BOARD OF HEALTH AND GAS-MAINS FOR HOUSING SCHEMES.

Mr. Alex. M'Kinna, the Housing Secretary to the Scottish Board of Health, writing to Mr. W. E. Whyte, O.B.E., the District Clerk of the Middle Ward of Lanark, regarding the extending of gas-mains to houses provided under the State-Assisted Housing Scheme, says:

"I am directed to inform you that the Board have had under further consideration the question as to whether any part of the cost of the provision of gas-mains for state-assisted housing schemes can be allowed to rank against the housing grant; and in this connection I am to state that the Board do not see their way to depart from the decision already intimated—viz., that no part of the cost of gas-mains can be admitted as a charge against the State subsidy. I am, however, to add that (following upon a meeting with representatives of the gas undertakings in Scotland) the Board have under consideration a proposal that the Treasury be approached with the view to ascertain whether they would be prepared to sanction an arrangement under which a local authority might guarantee to the gas authority a specified return on any expenditure incurred in the provision by the gas authority of gas-mains for State-assisted housing schemes, and to allow any expenditure by the local authority in implementing their guarantee to rank as part of the cost of the State-assisted scheme. If your local authority have any suggestions to make on the lines of giving such a guarantee, the Board will be glad to receive them."

The District Committee agreed to leave this matter in the hands of the Clerk to adjust with the Board of Health.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

London, *April* 18.

The London tar products market continues without interest, little business being done, and prices generally remain nominal.

Sulphate of ammonia continues in fair demand, in spite of the lateness of the season.

Tar Products in the Provinces.

April 18.

The average values for gas-works products during the week were: Benzole 90 p.ct. North, 2s. 10d. to 3s.; crude 65 p.ct. at 120° C., 2s. 3d. to 2s. 5d. naked at makers' works; 50-90 p.ct. naked, North, 2s. 11d. to 3s. 1d. Toluol, naked, North, 3s. to 3s. 1½d. nominal. Coal tar crude naphtha in bulk, North, 11½d. to 1s. Solvent naphtha, naked, North, 2s. 3d. to 2s. 4d. Heavy naphtha, North, 2s. 9d. to 3s. Creosote, in bulk, North, liquid, 8¼d. to 8¾d.; salty, 8d. to 8½d. Heavy oils, in bulk, North, 10½d. to 11½d. Carbolic acid, 60 p.ct., 1s. 8d. to 1s. 10d. Naphthalene, £20 to £30; salts, £7 to £9, bags included. Anthracene, "A" quality, 10d. to 1s. per minimum 40 p.ct.; "B" quality, nominal.

Manchester District Tar Prices.

Manchester, *April* 15, 1921.

The average price realized per ton for the sale of tar, according to the sliding-scale, for February, was £4 9s. 1·74d.

FROM A MARKET CORRESPONDENT.

Tar Products.

There is very little change in the condition of coal-tar products. Supplies of several of the products are becoming scarcer, owing to distillers being short of crude tar. The market in pitch is most unsettled. Business is still slow; consumers having plenty in hand which they cannot use. So far as one is able to talk about prices, they may

USE Simmance's

DEAD BEAT INDICATORS

instead of WATER-TUBE GAUGES and

"READ THE PRESSURE BY THE POINTER."

No liquid to evaporate and no levels to adjust.

No glasses to break and nothing to clean.

Direct reading, Open scale, Any range (Pressure, Vacuum, or Combination).

Incorrodible, Accurate, for foul or purified gas.

MADE IN MANY RANGES WITH TABLETS LETTERED AS DESIRED.

ALEXANDER WRIGHT & CO., LTD., WESTMINSTER.

Agents: Australia—FYVIE & STEWART, 360, Collins St., Melbourne; Canada—W. P. ROPER, 502, Merchants' Bank Building, Montreal.

be anything between 55s. and 75s. per ton. The market in naphthalenes is practically dead for the time being; and the nominal prices remain as last week. Cresylic acid is a weak market, and worth only about 2s. 4d. for pale qualities, and 2s. for dark. Carbolic acid is much as it has been for months past; the price of crude 60's being nominally 1s. 8d., and of crystals roughly 6½d. per lb. There is very little benzole about; but for the time being there is plenty of petrol, so we are not likely to witness any advance in benzole. Benzole 90 p ct. is quoted at 2s. 10d. in the North, and pure benzole is worth 3s. Creosote is possibly worth 8½d.; solvent naphtha, 2s., and heavy naphtha, 2s. 2d. per gallon. The market in intermediate products is almost lifeless. Aniline oil and salts are in very small request at 1s. 8d. and 1s. 10d. per lb. respectively. Salicylic acid is rather firmer at 1s. 1d. for technical grade; while there is a better demand for "B.P." grade at 1s. 7d. per lb. Beta naphthol is in better request, although only small business is being placed at from 3s. to 3s. 3d. per lb. Technical resorcin is 7s. 6d., and crude sulphanilic acid 1s. 8d. per lb.

Sulphate of Ammonia.

The demand for home trade is fairly steady, and so far all requirements are being met with a fair degree of comfort. Naturally, in view of the fact that very little is being produced at the present time, there is practically nothing for export. The official rates of £24 11s. per ton are in operation for the Home market. The export figures for March show a decided improvement as compared with February, although the total is still below the figures for January. The total exports for the three months ended March 31 now amount to 52,313 tons, and are double those of the first three months of last year In March, a sudden demand from France appears to have placed that country at the head of the list, with 10,813 tons compared with 2308 tons in March last year. Spain and the Canary Islands come second with 5043 tons, following with Dutch East Indies, 1067 tons, and British West Indies, 370 tons. From America comes the news that the manufacturers are still maintaining their firm attitude; but, on the other hand, there are re-sellers who are inclined to reduce prices. Generally, however, buyers are holding off for the present. There are free offerings for immediate delivery at considerable concessions.

Complete Gasification Plant for Richmond (Yorks.).—The Richmond (Yorks.) Town Council have decided to instal a complete gasification plant, to be supplied by Messrs. Drakes, Ltd., of Halifax, at an estimated cost of £600. Mr. Morten said that by degrees Richmond could adopt the modern plant invented last year by Mr. Frank H. Robinson, the Gas Manager at Harrogate. He had visited Harrogate, and seen the plant at work; and it seemed simplicity itself. Under the old system, they obtained 11,000 c.ft. of gas per ton of coal; whereas under the new they would get 40,000 c.ft. The saving in coal to the Corporation would represent about £1000 a year; but the coke sales would be down £150.

The Malvern Appointment.—It was reported to the Malvern Urban District Council that the Gas and Electricity Committee had selected three from a number of applicants to fill the vacancy of Gas and Electrical Engineer; and the question of choice being brought before the Council, a scheme for the appointment of officials already in their employ to undertake the duties was mentioned. Captain Fergusson urged that the work could be done by those already in the Council's service, whereby £400 or £500 could be saved. He moved that Mr. Mark Jeynes (assistant in the Electrical Department) be appointed Electrical Manager, Mr. John Hyde (assistant in the Gas Department) Gas Manager, and Mr. W. C. Smith Joint Secretary and Accountant. He pointed out that they were all capable men. A long discussion took place; and eventually it was decided to refer the matter to a Committee of the Whole Council.

Mother and Three Children Poisoned by Gas.—On Monday last week, a mother and her three children were found dead from gas poisoning in their bedroom, at Hollinwood, near Oldham. They were: Mrs. Sarah Elizabeth Bell (aged 46), Florence Rosa Bell (21), William Alfred Bell (12), Phyllis Annie (9). Everything had apparently been all right at the house until the previous Wednesday, which was the last day on which Mrs. Bell was seen alive, in an adjacent newsagent's shop. For a day or two the people next door complained of a strong smell of gas upstairs, and had been unable to use their bedroom in consequence. Later a plumber went to examine the pipes at the newsagent's shop, and suspecting something wrong at Mrs. Bell's, got through the front bedroom window. He was met by an overpowering smell of gas, and discovered that the taps in both bedrooms were turned fully on. In the back room he found the mother and her three children dead on the beds. A dog which was left in the house was discovered alive, but very ill.

A Presentation at Armley, Leeds —A very pleasing ceremony was carried through last Friday at Wilsons and Mathiesons, Ltd., Carlton works, Armley, when a present, which had been subscribed for by the whole of the workpeople, was made to Mr. Henry Wilson, on his seventieth birthday. The meeting was presided over by the works' foreman (Mr. T. Bell), who, in very appropriate words, spoke of the excellent relationship which had always existed between employer and the employee at the works, and the great esteem in which Mr. Henry Wilson was held by all the workpeople, and said he and many more in the works had been with the firm for over forty years. The presentation was made by the oldest employee, Mr. A. Lee. Mr. Henry Wilson, in acknowledgment, expressed the great pleasure he had in accepting the present as a token of a fellowship which was in strong contrast to conditions elsewhere. He also spoke of the changed conditions of work since he entered the workshop fifty-six years ago, when the day's work commenced at 6 a.m. and finished at 6 p.m., and on Saturday's from 6 a.m. to 4 p.m. (there being no football matches in those days). He was most gratified to know of the good relationship that existed between them—as exhibited by the present they had given him—and he hoped it would long continue.

No Triple Alliance.

THERE is no Triple Alliance between the gas connection, draw-off cock and flue outlet on Main's "LAUNDRESS" Boiler. Each is entirely independent and can be set at the most convenient angle and the most suitable place irrespective of the position of the others. Easy and economical to fix.

R. & A. MAIN, LTD.

EDMONTON, N. 18, FALKIRK, &c.

Stockton-on-Tees Corporation Gas-Works.

At Stockton the gas undertaking was expected last year to have an income of £118,000, and it came to £154.000, notwithstanding the fact that £10,000 was dropped on the gas-rents, largely because of the record "cut" in the price of gas for a short period. Coke sales realized £79,000, as compared with £38,000 estimated; while £9800 was received from the sale of tar, oil, pitch, &c., instead of the £3260 anticipated. These abnormal figures (due to unforeseen circumstances) were reflected in the expenditure. An estimated outlay on coal of £52,000 eventually came to £71,000; carbonization charges went up by £3000; water gas, by £5000; maintenance of works, by £3000; rents, rates, and taxes, by over £2000; and new meters to the same extent. The expenditure in all amounted to £152,000, against the expected £117,000. Last year's balance of £2421 has been added to the reserve account, which will be greatly depleted by renewals. A year ago £10,000 came out of the gas-works profits for rate relief.

Hot Water Supply and Heating Apparatus.

All who are desirous of keeping themselves fully abreast with the progress that is being made in connection with gas-heated hot-water apparatus—and this applies to everyone engaged on the distribution side of the gas industry, as well as to many other people—will find matter to interest them in the handsomely bound and fully illustrated "Victor" catalogue that has just been issued by Mr. Thomas Potterton, of Cavendish Works, Ravenswood Road, Balham, S.W. There are described fully in this book "Victor" boilers and complete apparatus suitable for meeting both large and small requirements under various conditions; and the details of measurements, ratings, &c., of the boilers are bound to prove useful to those who have to specify or to instal water-heating apparatus. Thermostats of many types are included, as well as particulars of the "cut-out" valve system (invented and patented by Mr. Potterton) and "night-valve" equipment; while there is added to the catalogue a supplement dealing with installation work, which has been specially written with a view to indicating the proper use of the different equipment, and so assisting gas engineers, architects, and others who are interested in the erection of complete installations. Emphasis is laid on the fact that the appliances described are designed upon original lines, which are the outcome of a careful study of the subject from all aspects, extending over a period of twenty years.

An order has been received from the Halifax Corporation for the installation of a Tully gas plant of a capacity of two million c.ft. per day.

A Company entitled the Nantlle Vale Gas Company, Ltd., with offices at Penygroes, was registered on the 8th inst., with a capital of £2000 in £1 shares, to acquire the business of gas and coke makers and suppliers carried on by the Holyhead and North Wales Gas Corporation, Ltd., at Nantlle, Carnarvon.

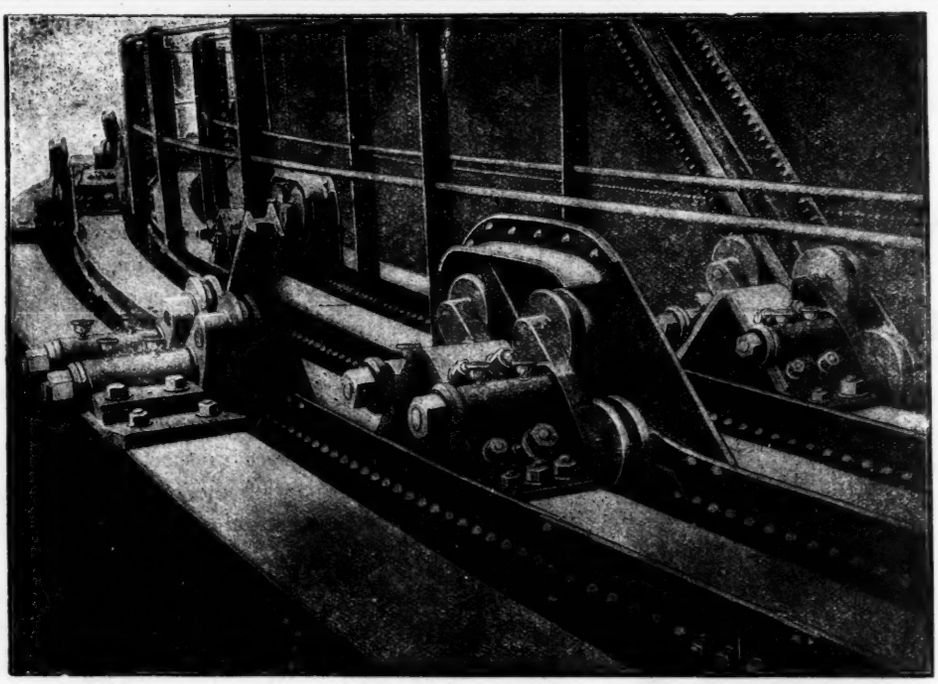
Kidderminster Gas Company.

The Kidderminster Gas Company held their annual general meeting on Thursday last—Colonel Goodwin in the chair. He pointed out that the Company were only able to pay half the usual dividend, owing to the continued increase in labour charges and cost of material, particularly coal. It was very satisfactory to note that the sales of coke, sulphate of ammonia, and tar continued good. Reference was also made to the trouble that had arisen through the extraction of toluol for the manufacture of high explosives for the Government, and from which the Company had received no financial benefit. The result of the extraction of toluol, and other essential oils had been that naphthalene was deposited in the mains, and caused the consumers great trouble, and the Company considerable expense, besides other losses impossible to estimate. Last year the Company put down special apparatus to deal with this; and they hoped that at last a cure had been found, as the number of complaints had dropped to practically the pre-war total. The dividend of 2½ p.ct. on the ordinary shares for the half year was declared.

New Gas Plant for Airdrie.

At the meeting of the Airdrie Town Council on the 7th inst., the Gas Committee's report with reference to new gas plant was read. Having completed their investigations into the merits of various plants, they recommended the installation of a carburetted water gas plant of 480,000 c.ft. daily capacity, by Messrs. Humphreys and Glasgow, Ltd., to cost £6555, subject to a sliding-scale according to the rise and fall in the price of materials. Convener Bailie Goldie, along with the Manager (Mr. Arch. Kellock) had visited Stirling and seen similar plant in operation. In Airdrie it was, he said, absolutely necessary that they should have some additional plant to supply gas next winter, and the question for the Committee had been what plant to adopt. They had given long and anxious consideration to the problem. They had first considered the erection of vertical retorts, and had visited various places to inquire about them; but the outlay required put this type out of account altogether—the cost being about £40,000. They had the advice of some leading gas engineers, including their own former Managers (Mr. Currie and Mr. M'Lusky), and they were convinced that this was the best they could do for a town like Airdrie. The recommendation was unanimously adopted; and full powers were given to the Committee to proceed with the erection of the new plant.

The Directors of the Imperial Continental Gas Association recommend a final dividend of 2 p.ct. in respect of the half-year ended Dec. 31, payable on June 1, less tax, on the £4 940,000 capital stock to holders registered the 10th prox. In view of the return of 60 p.ct. of the above-mentioned amount of capital stock, this dividend is equivalent to 5 p.ct. upon the present capital stock of £1,976,000.



THE NEW "BEARSCOT" TWIN GUIDE ROLLERS

R. & J. DEMPSTER, LTD.,

London Office:
34, VICTORIA STREET,
WESTMINSTER, S.W. 1.

MANCHESTER.

"Wonderfully Accurate" Test Holders.—It is necessary under the Statute for the standard holders at the London County Council's various gas-meter testing offices to be re-verified by the Board of Trade once every ten years; and this has just been done in connection with the holders at the Spitalfields office. The Public Control Committee of the Council say that, despite the fact that these standard holders have been in use for sixty years, they were reported to be wonderfully accurate.

Saving Gas in Meter Testing.—The Public Control Committee of the London County Council have had under consideration the desirableness of adopting the method of testing meters by air instead of by gas, as permitted by the Gas-Meter Regulations, 1920. This plan, they say, has proved very successful in the provinces; and, having regard to the large saving—estimated at about £400 to £500 annually—which will be effected thereby, they have made arrangements for the supply and installation at the Council's four meter-testing offices of the necessary apparatus, at a cost of approximately £400.

Increase in Price at Sunderland.—The Sunderland Gas Company announce an increase in the price of gas of 1s. 6d. per 1000 c.ft., making the price now 4s. for lighting, heating, and cooking, and 3s. 10d. for power purposes. The increased price, which will date from the next quarterly readings of the meters, is due to the cost of coals being now 28. 9d. per 1000 c.ft. of gas made, as against 1s. in 1914. Wages have also gone up nearly 200 p.ct., and are now 1s. 5d. per 1000 c.ft.; while a further serious fall has occurred in residuals.

Gas Supply of Wath.—With the withdrawal of the coke-oven men from the Manvers Main ovens, the lighting of Wath, which is obtained in its crude state from this source, was in jeopardy. Mr. Wright, the gas-works manager, has been busy preparing the Wath plant since he received notification that the sources of supply would be discontinued, and he and his staff were last Saturday week enabled to carbonize at the Wath gas-works. This means that the Wath, Bolton, Goldthorpe, and Thurnscoe areas will have a supply of gas at least for household purposes, until the stock of gas coal is exhausted.

STOCK MARKET REPORT.

THE Stock Exchange has had an interesting week, fuller of variety and general interest than recent weeks have been. It opened in an improved and improving tone, and business began to quicken-up with several markets exhibiting more strength. But next day the protracted uncertainty of the strike negotiations threw things back again, and extreme quietude prevailed. On Thursday, however, another change set in, and thenceforward brighter views were built on improved expectations.

The gilt-edged market was firm. Home Government issues of all descriptions advanced. The big four on Friday marked: Consols 48¼—48⅝, War Loan 87½—87¾, Funding 70¾—71, Victory 76⅜—77. Colonials were inquired for, and Corporation issues were firm. Home Rails continued to be in good favour. Canadians were better; but Argentines remained dull.

The Foreign Market had good points in French, Italian, Chilian, and Chinese.

The Miscellaneous Market indicated improvement in some industrials—notably Textiles and Iron and Steel—and Oils showed some advance in favour; but Rubbers were dullish.

Business in the Gas Market fell to the most meagre proportions. It is no exaggeration to say that the aggregate of the week's transactions might well have formed the work of one day. There was no particular tendency or characteristic in any group of undertakings. The London Companies were just alive, but made no move. Alliance and Dublin were a shade better, and Newcastle slightly lower. Imperial Continental fell 2 on the announcement of a 2 p.ct. dividend. But this dividend, be it remembered, is equivalent to 5 p.ct. upon the now reduced capital.

Bargains done for cash during the week were as follows: On Monday, Brentford "A" 52½, European 7, 7¼, Gas Light ordinary 52, 52⅝, 52½, ditto preference 58, ditto debenture 47½, Imperial Continental 155½, Primitiva preference 26s. 3d., South Metropolitan 62½, 63, Woking 5 p.ct. "C" preference 55. On Tuesday, Brentford "A" 53½, Commercial 4 p.ct. 51, European 7⅛, 7¼, Gas Light ordinary 52½, Imperial Continental 155¼, 155½, 157, Monte Video 64½, 65, South Metropolitan 62½, 63¼. On Wednesday, Gas Light ordinary 52, Imperial Continental 155, 155½, 157, Oriental 87, Primitiva 10s., ditto preference 26s. 6d., South Metropolitan 62½, 63, ditto debenture 46, Tottenham "B" 53. On Thursday, Commercial 3½ p.ct. 46, European 7⅛, 7¼, Gas Light ordinary 51½, ditto preference 57½, Imperial Continental 155, 156, 156½, South Metropolitan 63, 63¼, Tottenham "A" 58½, ditto "B" 52, Woking 7½ p.ct. debenture (1936) 100, Colonial 9s. 9d., 10s. On Friday, Brentford "B" 52½, Gas Light ordinary 51½, 51¾, Imperial Continental 155, 156½, Montevideo, 63, Oriental 86, Primitiva preference 28s., San Paulo debenture 37½, South Metropolitan 63¼, South Suburban 56½, Tottenham "A" 59½.

In the Money Market, there was a strong demand, and rates ruled very firm almost up to the close of the week, when increasing supplies came to the relief of the situation. Terms for discount were similarly firm. Silver fluctuated considerably, rising to 36½d. and then falling to 33⅜d., as supply and demand oscillated. The Bank rate remains at 7 p.ct., as fixed on April 17, 1920.

Lead wool is now being used for jointing high-pressure gas-mains at Lymm (Cheshire) and at Ryde, Isle of Wight. The mains are 6 in. and 4 in. diameter.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

Issue.	Share.	When ex-Dividend.	Ante-War Dividend & Bonus.	Last Dividend.	NAME.	Closing Prices, July 30, 1914.	Present Prices.	Lowest and Highest Prices of Bargains.
£			p.c.					
182,049	Stk.	Mar. 11	4	4%	Aldershot 4 p.c. Pref.	...	53—58	...
1,551,868	,,	Apl. 14	2½	3⅛%	Alliance & Dublin Ord.	59—64	37—42*	...
374,000	,,	Jan. 13	4	4%	Do. 4 p.c. Deb.	76—79	47—52	...
280,000	5	Oct. 28	7½	8%	Bombay, Ltd.	5½—6½	4—4½	...
100,000	5	Feb. 25	16	5%	Bournemouth Gas and Water (5 p.c. ; B 7 p.c. ; Pref. 6 p.c. ; 4 p.c. Deb.)	...	7—8	...
383,110	10	,,	7	7%		15—15½	8½—9½	...
115,000	10	,,	6	6/-		13½—14	7½—8½	...
162,065	—	Dec. 30	—	4%		...	55—60	...
992,045	Stk.	Feb. 25	14	30/-	Brentford A Consolid.	261—266	50—55	52½—53½
734,920	,,	,,	11	26/3	Do. B New	204—209	47—52	52½
55,000	,,	,,	5	5%	Do. 5 p.c. Pref.	109—111	68—73	...
221,400	,,	Dec. 15	4	4%	Do. 4 p.c. Deb.	91—93	57—59	...
214,775	,,	Mar. 11	11	7½%	Brighton & Hove Orig.	208—213	95—105	...
244,200	,,	,,	8	5½%	Do. A Ord. Stk.	154—159	65—75	...
1,287,500	Stk.	July 29	5	5%	Bristol 5 p.c. max.	...	...	...
530,000	20	Mar. 30	12½	10%	British	44—45	21—23	...
120,000	Stk.	Dec. 30	4	4%	Do. 4 p.c. Deb. Stk.	88—90	50—55	...
245,771	,,	,,	4	4%	Buenos Aires 4 p.c. Deb.	85—87	37—40	...
100,000	10	May 27	—	—	Cape Town & Dis., Ltd.	1½—2½	7—7½	...
100,000	10	Dec. 10	—	4½%	Do. 4½ p.c. Pref.	4—6	5—6	...
100,000	Stk.	Dec. 30	4½	4½%	Do. 4½ p.c. Deb. Stk.	70—75	55—60	...
157,150	,,	Feb. 26	5	5%	Chester 5 p.c. Ord.	108—110	...	...
1,513,280	,,	Feb. 25	5/9/4	30/-	Commercial 4 p.c. Stk.	106—108	47—52	51
560,000	,,	,,	5½	26/3	Do. 3½ p.c. do.	103—105	45—50	46
475,000	,,	Dec. 15	3	3%	Do. 3 p.c. Deb. Stk.	69½—71½	42—45	...
800,000	,,	Dec. 11	4	—	Continental Union Ltd.	76—79	20—25	...
200,000	,,	,,	7	—	Do. 7 p.c. Pref.	115—118	30—40	...
51,600	,,	Feb. 5	15	10%	Croydon A 10 p.c.	...	120—130	...
278,400	—	,,	12	7%	Croydon B and C 7 p.c.	...	95—105	...
492,270	Stk.	—	6	4½%	Derby Con. Stk.	123—125	...	...
55,000	,,	—	4	4%	Do. Deb. Stk.	102—104	...	...
1,002,180	10	Jan. 29	10	5/0	European, Ltd.	17½—18	6½—7½	7—7½
16,298,975	Stk.	Feb. 10	4/17/4	30/-	Gas Light and Coke (4 p.c. Ord. ; 3½ p.c. max. ; 4 p.c. Con. Pref. ; 3 p.c. Con. Deb. ; 10 p.c. Bonds.)	98—102	51—54	51½—52½
2,600,000	,,	,,	3½	26/3		76—79	40—43	...
4,062,235	,,	,,	4	4%		96—99	56—59	57½—58
4,674,850	,,	Dec. 15	3	3%		72½—74½	46—49	47½
130,000	,,	Dec. 11	10	10%		...	...	...
82,500	,,	Mar. 11	5	3½%	Hastings & St. L. 5 p.c.	...	48—53	...
258,740	,,	,,	3½	2½%	Do. 3½ p.c.	87—89	34—39	...
70,000	10	May 13	11	8%	Hongkong & China, Ltd.	16½—16¾	8½—9½	...
86,600	Stk.	Mar. 11	9	5¾%	Hornsey 7 p.c.	...	75—85	...
131,000	,,	Mar. 30	7½	3½%	Ilford A and C	151—154	75—79	...
65,780	,,	,,	6½	2½%	Do. B	115—118	55—60	...
65,500	,,	Dec. 30	4	4%	Do. 4 p.c. Deb.	92—94	54—56	...
1,976,000	,,	,,	9	5%†	Imperial Continental	150—160	153—158	155—157
1,235,000	,,	Feb. 10	3½	3½%	Do. 3½ p.c. Deb. Red.	84—86	75—80	...
235,242	,,	Mar. 30	6½	3½%	Lea Bridge Ord. 5 p.c.	119—121	58—63	...
2,498,905	,,	Feb. 26	10	37/6	Liverpool 5 p.c. Ord. (A; B.)	211—213 / 146—148	...	...
306,083	,,	June 26	4	4%	Do. 4 p.c. Pr. Deb. Stk.	...	...	...
165,736	,,	Feb. 25	7/3/6	3½%	Maidstone 5 p.c.	...	52—57	...
75,000	5	June 11	6	3%	Malta & Mediterranean	4½—4¾	2½—2¾	...
250,000	100	Apl. 1	4½	4½%	Met. of Melbourne 4½ p.c. Deb.	99—101	88—93	...
541,920	Stk.	Nov. 26	4	6%	Monte Video, Ltd.	11½—12	60—70	63—65
1,875,892	,,	Feb. 25	4½	3½%	Newcastle & Gatsh'd Con.	98½—99½	54—56	...
529,705	,,	Dec. 30	3½	3½%	Do. 3½ p.c. Deb.	82—83	50—51	...
15,000	10	Mar. 11	—	8%	North Middlesex 10 p.c.	...	12½—13	...
35,940	10	,,	7/14/0	58%	,, ,, 7 p.c.	14—15	7—7½	...
300,000	Stk.	Nov. 26	8	8%	Oriental, Ltd.	117—122	87—92	86—87
60,000	5	Mar. 26	10	1/-	Ottoman, Ltd.	7½—7¾	2—3	...
60,000	30	Feb. 25	13	7½%	Portsea Island, B	128—131	65—70	...
100,000	30	,,	12	6½%	Do. C	118—121	50—55	...
249,980	5	April 29	8	—	Primitiva Ord.	5½—6	½—¾	10/-
499,960	5	June 26	5	—	Do. 5 p.c. Pref.	4½—5	1 5/16—1 7/16	26/3—28/-
521,600	100	Dec. 1	4	4%	Do. 4 p.c. Deb.	91—93	67—69	...
600,000	Stk.	Jan. 27	4	4%	Do. ,, ,, 1911	...	37—40	...
346,198	,,	Dec. 30	4	4%	River Plate 4 p.c. Deb.	85—87	37—40	...
150,000	10	Mar. 30	6	6/-	San Paulo (6 p.c. Pref. ; 5 p.c. Deb.)	10½—11	6—7	...
135,000	50	Jan. 3	5	5%		47—49	37—39	37½
135,000	Stk.	Mar. 30	10	5%	Sheffield A	223—224	64—67	...
209,984	,,	,,	10	4½%	Do. B	222—224	64—67	...
523,500	,,	,,	10	3½%	Do. C	220—222	62—64	...
133,201	Stk.	Sept. 15	4	4%	Shrewsbury 5 p.c.	...	...	...
90,000	10	Sept. 30	9	9%	South African	10½—11½	10½—11½	...
6,609,895	Stk.	Feb. 10	5/4/0	5%	South Met. Ord.	111—113	62—65	62½—63½
250,000	,,	Jan. 13	—	5%	Do. Red. Pref.	...	90—92	...
1,895,445	,,	,,	3	3%	Do. 3 p.c. Deb.	72½—74½	45—48	46
224,820	,,	Feb. 25	8½	7½%	South Shields Con. Stk.	157—159	86—88	...
1,087,795	,,	,,	6	3½%	S'th Suburb'n Ord. 5 p.c.	114—116	56—61	56½
247,558	,,	Dec. 30	5	5%	Do. 5 p.c. Deb. Stk.	116—118	65—70	...
647,740	,,	Nov. 12	7½	3½%	Southampton Ord.	99—102	55—58	...
121,275	,,	Dec. 30	4	4%	Do. 4 p.c. Deb. Stk.	...	57—59	...
120,000	,,	Feb. 25	—	3½%	Tottenham (A 5 p.c. ; B 3½ p.c. ; 4 p.c. Deb.)	135—138	57—62	58½—59½
782,275	,,	,,	6	2½%		115—117	50—55	52—53
181,255	,,	Dec. 15	4	4%	District	87—89	55—58	...
182,380	10	Dec. 30	5	—	Tuscan, Ltd.	5—6	1—2	...
149,900	10	July 1	5	5%	Do. 5 p.c. Deb. Red.	93—95	45—50	...
236,476	Stk.	Feb. 25	5	3½%	Tynemouth 5 p.c. max.	108½—109	68—70	...
30,000	,,	Feb. 25	8½	47/6	Wandsworth, Wimbledon, and Epsom— Wandsworth A 5 p.c.	151—156	75—80	...
255,636	,,	,,	6½	32/6	Do. B 3½ p.c.	129—134	53—58	...
108,075	,,	,,	—	33/3	Do. C	...	50—55	...
140,865	,,	,,	—	33/3	New Ordinary	...	50—55	...
352,000	,,	,,	6½	26/3	Wimbledon 5 p.c.	117—122	43—48	...
98,000	,,	,,	6½	32/6	Epsom 5 p.c.	121—126	50—55	...
88,416	,,	Dec. 30	3	3%	3 p.c. Deb. Stk.	66—69	40—45	...

* Ex Div. † Next dividend will be at this rate.

An Increase of Price Likely at Smethwick.—At a meeting of the Smethwick Town Council last week, Alderman Pinkney, the Chairman of the Gas Committee, said that, unless some relief was forthcoming in the cost of coal and manufacturing charges, a further increase in the price of gas would become inevitable. Whatever might be the outcome of the proposition made to this country by the Germans as to a synthetic system of producing sulphate of ammonia, it was a serious thing for all gas undertakings. They, however, were not going to run away from the problem, but were going to fight it; and they hoped that if they had to lose this section of their trade, they would be able to make up for it in some other direction.

Haywards Heath and District Gas Company.—The annual meeting of the Company was presided over by Mr. E. C. Charleton, who moved the adoption of a satisfactory report. The profit, he said, was about £420 more than for 1919—a result chiefly due to the more stable position of labour in their works and better supplies of coal. Sales of gas had increased by 11·9 p.ct., which more than compensated for the extra £2000 they had paid out for coal. They were shortly applying for an Order under the Gas Regulation Act, which it was hoped would empower the paying of a higher dividend, besides ensuring a better service for the consumers. A dividend making £3 17s. 6d. p.ct. for the year (less income-tax) was declared.

Auckland (N.Z.) Gas Company, Ltd.—At the annual meeting of the Company on Feb. 7, the Chairman (Mr. J. H. Upton) reported that the profits for the year 1920 amounted to £47,522. The Directors recommended a dividend for the half-year of 11d. on the fully-paid £1 shares, and proportionately on the £1 contributory shares. The Chairman referred in his speech to their difficulties in obtaining coal, owing to the short output, in spite of existing State control. In the interests of the Dominion, the problem of declining coal supplies would sooner or later have to be resolutely faced and solved. Gas prices had been raised owing to the coal position and increased wages; but if the situation became no worse, there were prospects of a reduction. The proprietors' attention was called to the heavy burden of rates and taxes, which became more grievous as public properties and activities were increasingly exempted.

Seven veterans of the Manchester Corporation Gas Department have just retired. The aggregate of their ages is 505 years, and their length of service 329 years.

The proposal to form an Engineers' Club in London is, we learn, meeting with a large amount of enthusiastic support. Over a thousand applications for membership have so far been received.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

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